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SPICILEGIUM

NEILGHERRENSE

OR

A SELECTION

OF

NEILGHERRY PLANTS.

DRAWN AND COLOURED FROM NATURE,

WITH

BRIEF DESCRIPTIONS OF EACH; SOME GENERAL REMARKS ON THE GEOGRAPHY AND AFFINITIES OF NATURAL FAMILIES OF PLANTS, AND OCCASIONAL NOTICES OF THEIR ECONOMICAL PROPERTIES AND USES.

BY

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BOTANICAL
GARDEN.

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PREFACE.

THIS work was undertaken partly to gratify the taste and wishes of some friends who had an opportunity of examining the original drawings and who, thinking it would be a pity to throw away so much labour and skill of the painter by publishing them as uncoloured outlines, urged the propriety of at least publishing a few coloured sets, in case any of the purchasers of the Icones should wish to colour their copies. The force of their arguments backed perhaps by the promptings of an anticipated ready sale for the work, induced me so far to depart from my original plan as to have 100 extra copies struck off and coloured: the great expense of colouring preventing my incurring the cost of a larger impression.

Having gone so far it then became necessary to endeavour to add to their usefulness and interest by combining, in as popular a form as I could, some account of the Botanical families to which they belong and their connection with Alpine vegetation generally.

This I soon found a more difficult task to execute than I anticipated and, I greatly fear, the descriptive matter has become more scientific than was consistent with my first intentions or than is quite suitable to the tastes and previous information of many of my readers. I do not know that this need be a subject for regret, as possibly the perusal of the following pages may prove the means of inclining some persons to desire a deeper knowledge of the mysteries of the vegetable organization and economy than they supply, and induce them to have recourse to some of the more elementary works on Botany, written expressly for the elucidation of such matters.

Should such prove the case, I can, as the result of a good deal of experience, promise them a most enduring " feast of reason and flow of soul" of the purest and, in the right direction, most elevating kind! For who can study the wonderful and mysterious operations of life and endless adaptations of organization for the preservation, not merely of the individual, but of the species without having his soul elevated and purified, by being led through creation, to the contemplation of the wisdom and attributes of the Almighty Creator of all things animate and inanimate.

Grand and sublime as are the objects brought within the comprehension of

man by the powers of the Telescope, not less perfect and wonderful to the reflecting mind are those brought to light by the Microscope. In either case all is perfection, with this difference, that in the former we witness his perfections on a scale of grandeur far too magnificent for the comprehension of our limited faculties, while with the other we are easily enabled to detect organic structure in objects so inconceivably minute as to be almost invisible to the naked eye. With the aid of the former the motions through space of the heavenly bodies, distant many millions of miles, can be measured with such extreme accuracy as to show that in the course of thousands of years their rates of progression has not altered even a second of time, while by the latter we are enabled to trace evidences of complex structure and organization in the filmy dust of the moth's wing, or the equally minute particle of matter constituting a grain of pollen. Nay further, we learn from its use, that so infinitely varied and so constant are the forms of these minute objects that, in many cases, the practised observer can, by marking their differences, detect the families to which they belong, and can even tell, by the shape of the red globules in a drop of blood, whether it was drawn from the veins of a man or a lower animal.

These are no doubt extreme cases and demand an amount of skill in the use of the instruments not easily attained, but much, very much that is deeply interesting, can be learned from either by the merest novice, and each renewal of the attempt to interrogate nature by their means, adds to the skill of the observer. Such then are some of the dishes composing the endless intellectual feast which nature provides for her votaries and of which she, most bountifully, invites all to become partakers.

The magnified figures in the accompanying plates make no pretensions to such perfection in displaying the minutiæ of organization, but even in them are exhibited points of structure which could not be made out by the naked eye, and for the most part show, on a sufficiently large scale to be easily followed, these more minute and intricate portions of the flower, seed vessel, and seed, employed in tracing among plants their relationships to each other: a knowledge which forms the basis of our present Natural System and which if ever the true Natural System of Botanical classification, now so ardently sought for by all philosophical Botanists, is discovered, must still prove equally useful not to say indispensable towards its acquisition.

As it is not improbable some of my readers may only know of "Natural Systems" by name without having any very precise idea of what is meant by the term, I shall here digress a little to endeavour to convey some information regarding what Naturalists understand by it. Imperfect the effort must necessarily be for, in truth, even the most learned and philosophical among them, seem not to know quite clearly what they are in search of and of course can scarcely

be expected to inform others what they do not well understand themselves. For example, opinion is divided on the question of the existence or non-existence of a Natural System, some maintaining that there really is one of nature's own contrivance and others, that the, so called, "Natural System" is neither more nor less than a human contrivance by which the most nearly related species are brought together and placed, as much as possible in juxta position. This last doctrine I for one reject as unphilosophical and utterly at variance with innumerable facts and indications of wise design and contrivance which every division of nature presents for our consideration and instruction: without, however, going so far as to deny that those who maintain the doctrine can adduce many strong arguments in its support.

Those who maintain the existence of a Natural System set out by showing the admirable symmetry and just proportion which all nature's works, from the greatest to the least, present and bear to each other: and by tracing the delicate progression from group to group, family to family, and species to species, thence assume that there is not only a Natural System, but further, uphold the doctrine that there can be but ONE, justly observing, that it is impossible to suppose that, ALMIGHTY WISDOM, if he admitted system at all into his works of creation, would execute them so imperfectly as to admit irregularities, much less a medley of systems. The object then, of the philosophical naturalist is, they maintain, to approach as nearly as our finite faculties will permit towards the realization of this one grand and sublime idea, the discovery of The Natural System of organized beings.

Two methods are now in use for the attainment of this end or rather, limiting the statement to the vegetable kingdom, for the solution of the problem, what is the natural system of plants? These may be respectively called the *Linear* and *Circular* methods.

The first, it is admitted on all hands, is essentially artificial and can never succeed in placing the most nearly related objects of creation in juxta position, thus, to some extent, virtually admitting the existence of a circular one and its superiority as being the more natural of the two. Necessity, therefore, not choice constrains its continued employment, rather as providing a convenient kind of cabinet or store room in which to store our daily accumulating facts, in an easily accessible form, to have them in readiness for use so soon as a more natural arrangement is discovered, than as affording such an arrangement itself.

The supporters of the circular method claim for it a higher degree of perfection, that of really furnishing a clue to THE Natural System, and apparently with much reason on their side. This method assumes that nature has systematically arranged all her creations in a series of circular groups, each intimately united to

others by a complex but beautifully simple net-work of affinities interwoven, if I may so speak, with a similar net-work of more remote analogies, all of which are found to exist in every perfect circle and that these circles progressively diminish in magnitude from the highest to the lowest, until we arrive at the last link of the chain, *Species.* The primary circles are three, *Animals, Vegetables* and *Inorganic matter.* Animals being the Typical circle, Vegetables the sub-Typical and Inanimate matter the Aberrant; which last is made up of three minor ones the endless modifications of Earth, Water and Air; each equally perfect, thus making together a series of five.

Animals again divide themselves into three lesser groups viz. *Vertebrate Animals*—having an internal bony skeleton—*Annulose* animals (insects, crabs, &c.) having a hard crust or, as it were, an external skeleton—and *Acreta* or soft molluscous animals having neither proper bone nor crust.

Vegetables in like manner divide themselves into three primary groups viz. *Dicotyledons* or *Exogens,*—plants increasing in size by the addition of layers of new wood to the surface, or from without. *Monocotyledons* or *Endogens,* plants increasing in size by additions from within, the arborious forms of which have at first a hard crust, increasing in thickness towards the centre by additions of woody fibre to its interior. And lastly, *Acotyledons* or *Acrogens* flowerless cellular plants. The third or Aberrant group of each of these kingdoms is again divisible into three perfect circles. The Acretous circle of animals contains the *Acreta* proper—the *Mollusca* or slugs, snails, shell-fish, &c. and the *Radiata* or star-fish. The Acrogenous circle of vegetables in like manner naturally divides itself into *Fungi* or Mushrooms: *Protophyta* or Sea-weeds and Lichens: and *Acrobryous* or *Psendocotyledonous* plants including Ferns, Mosses, Hepaticæ, &c. The progressive blending between these circles in their own kingdoms is affinity. The more remote similarities or blending as it were of habits and properties often easily traceable between analogous circles of the two kingdoms is, the analogy mentioned as existing in every perfect circle.

Thus far the two kingdoms advance side by side and step by step together, presenting analogous groups in each. The Vertibrata represented by the Exogens—the Annulosa by the Endogens—the Acreta by the Protophta—the Radiata by the Fungi—and lastly the Mollusca by the Acrobrya or Psendocotyledonia.

But when we advance beyond this point and attempt to compare the Vertibrata and Exogens we are arrested at the first step. The former is clearly divided by the hand of nature into three self-evident groups the typical, *Mammals*—subtypical, *Birds*—and the aberrant, *cold-blooded Vertibrata* including *Reptiles*—*Fishes*—and *Amphibia,* each of which form a perfect circle, thus again completing the quinary series of circles. Where in the exogenous or corresponding circle

of plants do we find analogous groups? I am unable satisfactorily to answer the question, but still I cannot help thinking as I shall by and by show that parallel circles or groups may yet be found, and probably, when once traced will prove as self evident, even to the most casual observer, as the animal ones now are. The same remark is applicable to the Annulosæ and Exogens, where the parallel circles have not, so far as I am aware, been traced in the two kingdoms, but probably may readily be so, when the attempt is made by a competent observer who has made himself acquainted with the Zoological system, which, in first principles at least, seems to have gone far ahead of the Botanical.

Dr. Lindley in his elements of Botany has presented us with sketches of two circular arrangements of plants; each perhaps superior to those of any of his cotemporaries, but in which, so far as my comparatively limited acquaintance with the subject of circular arrangements, and indeed with the relationships of the vegetable kingdom generally, enables me to follow him, he does not appear to have succeeded in bringing out the affinities and analogies of his vegetable circles so clearly as Zoologists have their animal ones. In this opinion I may perhaps be greatly in error and in venturing to express it may only be exposing my own ignorance of the subject, but still, such is the impression conveyed to my mind by their examination. The first series of analogies between the two kingdoms is however known, and when Botanists have succeeded in tracing the second it seems probable the subsequent ones will prove less difficult, as the mass of knowledge of vegetable structure and function already acquired, but hitherto only sparingly applied to such purposes, will supply many new elements well adapted for forwarding the work of systematic arrangement. Jussieu founded his secondary divisions, in the Exogens, on the absence or presence of petals and on their being one or more: hence his *apetalous monopetalous* and *polypetalous* groups: and his terteary ones on the relative position of the ovary to the flower, that is, whether the stamens have an *inferior* (hypogynous) *superior* (epigynous) or *middle* (perigynous) attachment. DeCandolle has adopted this method with considerable modifications, but I do not think improvements as a natural arrangement, though well calculated to facilitate its use in practice.

Professors Lindley and Endlicher have each constructed arrangements of the natural orders, or Natural Systems of Botany, both very different from each other and from their apparently more simple, though less natural predecessors. This improvement they seem to have accomplished by the avoidance of what may be called linear characters, which must inevitably, in some part of their course, become constrained and artificial; causing, like the Adjutant's measuring rod, the widest separation of brothers, simply because the one happens to be the tallest the other the shortest man in his Regiment. By allowing greater scope or circularity to their divisional characters, they have been enabled to

bring together, under the name of alliances or classes, groups of allied orders which are occasionally widely separated by the procrustion operation of linear characters. But though much has, by these and other similar attempts been effected to improve our arrangements, I still think we are far behind Zoology through our not having yet discovered in our Exogenous and Endogenous groups, those almost self-evident secondary divisions or circles so clearly marked out by nature in the animal kingdom, and so ably taken advantage of by Zoologists, in working out their animal system.

To discover these, if they actually exist in Nature, appears in the present state of the enquiry to be the first and grand desideratum towards the discovery of the true Natural System of plants. In the mean time however, our established orders and genera being for the most part pretty nearly natural, aided by the convenient practical grouping now in use, serves all the purposes of a more strictly correct and philosophical arrangement, leaving us for the time, very independent of a better, and allowing us to proceed at our own pace, leisurely feeling our way, while searching for the long and ardently desired natural one. And it is in the hope that some of the readers of this exposition of what is wanted, towards the construction of the basement of the natural system of plants, may be induced to turn their attention to the subject and perhaps that some one luckier than the rest, may stumble on a clue which will lead himself or others to the desiderated point and enable him, by the formation of truly natural secondary groups or circles, to complete at least the lower tier of the edifice.

It only now remains for me to offer a few remarks on vegetable organization, with reference to its employment in the construction of a Natural System of Botany. These must unavoidably be brief and imperfect, and probably, so far as they go, little to the point, the ideas of Botanists on this obscure subject being far from precise or settled on a firm basis, especially in what relates to the comparative value which should be assigned to each part, engaged in the complex organization of an Exogenous plant.

The organ principally regarded as the basis of all our attempts to obtain a natural arrangement is the Embryo, when present, taken in connexion with the plant which springs from it, whether, in short, it is mono—or di—cotyledonous, giving origin to an Endogenous or Exogenous plant or is altogether absent as in Acrogens ; plants still further distinguished from those of the two higher groups by their Cellular texture and the nearly total absence of vascular tissue.

Dicotyledonous or Exogenous plants have a woody stem, varying in solidity with their age from the tender herbaceous annual up to the almost stony hardness of the iron wood tree : increasing, with some exceptions, in thickness by the annual addition to the surface, layer upon layer, of new wood, forming rings or

zones round the axis : these zones are intersected transversely by medullary rays radiating from the central pith. Occasionally, as above hinted, increase of thickness does not take place by means of annual Zones, the wood at whatever age appearing to consist of a single homogeneous zone. Dr. Lindley has taken advantage of this circumstance and brought together most of the families in which it occurs to form his group of *Homogens* distinguished by the Endogenous structure of their wood. Descending still lower in the scale we come to two groups of cellular plants, the *Rhyzanths* mushroom like plants, and the *Podostemons*, sea-weed like plants, agreeing with algæ in almost every thing except their fructification.

The leaves of Dicotyledons are, usually attached to, and separate from the stem by an articulation and are reticulated, that is their veins anastomose and form a net work, but this is not quite absolute as it is wanting in the leaves of most of the Gymnosperms.

The flowers are for the most part quinary in the number of their parts and are generally furnished with both calyx and corolla; but departures from both these rules are frequent: most of the Homogens have ternary, and many families quaternary flowers, while numbers have no corolla.

The seed is usually enclosed in a pericarp, but here also a striking exception occurs, the whole of the coniferus family, forming Lindley's *Gymnosperms* having naked ovules and seed, a privation combined with some interesting peculiarities of the Anatomical structure of the whole plant. The seed itself is either perfect or imperfect, that is, is furnished with an Embryo having two or more opposite cotyledons, or is sporulose : imperfectly developed as in Rhyzanths. The Embryo also is perfect or imperfect, with or without albumen. The albumenous ones are *intra* or *extra* albumenous, enclosed within the albumen like the yoke within the white of an egg, or placed on the outside of it, as in the case of the curvembryate orders.

From this description, brief and imperfect as it is, we find there are five modifications of structure, as regards vegetation, forming so many distinct groups. 1st Exogens as generally understood with the wood in Zones or concentric circles : 2d Homogens, first associated as a distinct group by Dr. Lindley: 3d Gymnogens or coniferæ: 4th Rhyzanths having more the structure of Fungi than perfect plants and 5th Podostemons which seem to have an anatomical structure nearly allied to algæ, but which Mr Griffith has determined, from actual dissection of the seed, to be dicotyledonous. Then as regards the structure of the seed, there are exalbumenous and two modifications of albumenous Embryos ; and a fourth where it is imperfect. The albumen, moreover, greatly varies in quantity, being sometimes very abundant with a minute Embryo, varying thence to a large embryo and very sparing albumen.

All these variations are available for the purposes of classification and doubtless when thoroughly investigated, with special reference to this object, will furnish very sufficient secondary circles. The zoned angiosperms *Zonagens* may then perhaps be found to represent the Typical circle, the parallel or analogy of Mammalia ; the *Homogens* the sub-typical, the parallel of Birds ; while the *Gymnogens*, the Rhyzanths *(Hysterogens)* and Podostemons *(Protogens)* would unite to form the aberrant circle. In this case the first would represent in the Exogenous circle, and have for its analogies in the general system of plants, the Dicotyledons the 2d the Monocotyledons, the 3d the Acrobrya or ferns, the 4th Hysterophyta or Fungi, and the last the Protophyta or sea weeds. Here we have a series of apparently circular groups all based on anatomical structure and physiological peculiarities, without reference to the anatomy of the seed, except in so far as regards the embryo. Whether these when properly analysed will prove perfect circles is a point still to be ascertained. It is a difficult enquiry and the whole subject is far too deeply involved in obscurity for me to offer any opinion in anticipation, beyond the passing remark that these groups have a circular appearance and give promise that, though they may not supply all we want, yet that their thorough investigation may put us on the right path and speedily enable us to reach the long and anxiously sought for goal.

Endogens have a stem increasing in thickness by additions of new matter to the centre, made up of vascular and cellular tissue, without distinction of pith, wood, medullary rays, or bark: the cellular tissue being traversed by bundles of vessels, often, as in all the arboreous forms, Palms, the surface first becoming hard and woody or as it were crustaceous. Leaves with parallel veins connected by smaller transverse ones, usually sheathing at the base and not readily separating by articulation. Flowers usually ternary, with both calyx and corolla, but sometimes both series so closely resembling each other in colour, size, texture, and form as to be undistinguishable ; or occasionally they are imperfect or altogether wanting. Seed in a pericarp. Embryo furnished with albumen or rarely exalbumenous, with one Cotyledon, or if more, alternate, (not opposite as in dicotyledons) the radicle enclosed within the Embryo through which it bursts in germination.

From this general description it would appear there is a uniformity of structure of both the vegetation and seed, little favourable to the formation of well defined groups. This however on closer inspection is not found to be the case as regards the habit and vegetation of several tribes. We have for example the Lilaceous class, as understood by Redoute, including nearly all the gay flowering herbaceous forms. The palms. The Retose families of Lindley, representing the Homogens, generally composed of climbing shrubs with homogenous wood and dicotyledonous foliage but monocotyledonous seed. The Aroideous families,

and lastly the Glumaceous. How far these five groups are strengthened by variations in the conformation of seed, I am as yet unable to say, not having given that attention to the subject which it requires, but I apprehend when they also are closely examined, with special reference to this enquiry, that many points in confirmation of their stability will be found and, with their aid, a series of perfect circles be discovered presenting striking analogies with others referable to the exogenous circle. Until however this is effected Lindley's very practical, I think also most natural distribution of these tribes, leaves little to be desired by the practical botanist.

On the last great division of the vegetable kingdom the *Acrogens* or Cryptogamic plants I have nothing to add to what I have already said. This group certainly forms the aberrant circle, and like the analogous circles in the animal kingdom is made up of three smaller ones, each of which seems complete, though all require verification.

For those wishing to acquire a deeper insight into the science of plants than these pages can possibly supply, I would particularly recommend the study of Dr. Lindley's Elementary Botanical works which are by far the best in the English language. His recently published Vegetable Kingdom I have not yet seen, but it is very highly spoken of by two of my Correspondents who have. In its arrangement, I learn, he has considerably departed from both those referred to above, as given in his Elements and Natural System, falling back in a great measure on the plan of Jussieu, but greatly improved. To those desirous of becoming acquainted with the first principles, and many of the details of the circular system of classification, Swainson's volumes of Lardner's Cyclopædia are the only easily procurable text books and are among the most interesting volumes I ever read on Natural History.

NEILGHERRY PLANTS.

I. RANUNCULACEÆ.

This is an extensive and beautiful family of plants, many of which, such as the Clematis, Ranunculus, Anemone and Larkspur, rank among the most admired favourites of the flower garden and arbour. Its species abound in Extra-tropical countries, but are of such rare occurrence within the Tropics that, so far as I yet know, there are not above 12 or 14 found, truly indigenous, in the whole of the Indian peninsula, the flora of which amounts to probably not fewer than 5000 species of flowering plants, of all descriptions, or it stands in the ratio of about 1 to every 400 species found within the same limits. The paucity of Ranunculacious plants, within the Tropics, may be further shown by comparing them with the Flora of the whole world : thus, assuming that there are 600 species of Ranunculaceæ, and that there are 80,000 species of flowering Plants, they then stand in proportion of one to every 133 species.

According to published lists, the Indian peninsula, within an elevation of 500 feet above the sea, can only claim one species *(Naravelia Zeylanica)* and that of rare occurrence within these limits. This plant, which abounds at the foot of the Hills, is an extensively climbing shrub so nearly allied to *Clematis* as almost to require a Botanist to distinguish them. Such being the case, it naturally follows that the next in succession should be a *Clematis*, and such in fact is the case, *Clematis Gouriana* (Nos. 1 and 2) being frequent on the table-land of Mysore and also on the eastern slopes of the Neilgherries, at an elevation of between two and

three thousand feet. None of the other species found on these Hills, except perhaps *C. Munronii*, which I found in the jungles below Sispara descend much below six thousand feet of actual elevation, though all occur within a few hundred feet above that limit.

Continuing our ascent of the Neilgherries, the next species that presents itself is the *Clematis Wightiana* (No. 3) which abounds in the thickets about Kaity and along the road from thence to Ootacamund. The *Anemone Wightiana*, begins to show itself occasionally about Coonoor, but is no where frequent until we have nearly attained the level of Ootacamund, where in the pastures, especially on moist ground, it becomes most abundant, but still ascends to the highest range of the Hills. The species of *Ranunculus* are of rarer occurrence, two species being generally met with in clumps of jungle, and the third (*Ranunculus reniformis*) is sparingly scattered over the higher pastures on the more elevated hills and, in such situations, is well calculated to remind the European sojourner of the Butter Cups which so charmingly variegate the Hill-side pastures of our Father Land. It is also met with in swampy grounds about Ootacamund.

The number of truly native species on the hills, so far as yet found, amounts only to nine or perhaps ten. Thirteen are described in our Prodromus, but three of these I have since satisfied myself are introduced, namely the *Adonis* (Pheasant's eye) and two species of *Delphinuim* (Larkspur.) The remaining plant excluded from the present list is *Anemone dubia* which I have ascertained to be a mere variety of *A. Wightiana.* These nine are referable to five genera, namely, *Clematis 3*, *Naravelia* 1, *Thalictrum* 1, *Anemone* 1, and *Ranunculus* 3. In still further proof of the extra tropical character of this family I may mention, that Dr. Royle enumerates in his Illustrations of the Himalayan Flora, no fewer than 72 species of *Ranunculaceæ* found on the Himalayas and in Cashmere.

CLEMATIS. *Linn.; (Travellers Joy—Virgin Bower.)*

Involucre none or resembling a calyx, and placed under the flower. Sepals 4-8, coloured, in æstivation either valvate or with their edges bent inwards. Petals none, or shorter than the sepals. Stamens numerous. Achenia several in each flower, terminated by a long tail. Seed erect.—Perennial plants with opposite leaves, which are simple, trifoliate, or once or twice pinnate, with a terminal leaflet.

This is a fine genus of beautifnl climbing plants,—all the species of which seem well adapted for arbours,—and in Europe are much employed for the formation of these retreats, (hence I presume the old English names) as well on account of their rich foliage as for the profusion of their flowers a feature long preserved by the beautiful silky hairs of the long feathery tail of their seed, (a rude idea of which I have attempted to convey in Plate No. 2), a mark which readily distinguishes this section from the rest of the family. The genus *Clematis* includes about 150 species which are scattered all over the world. The flowers are apetalous with petaloid sepals. Naravelia differs in having both Calyx and Corolla.

1. 2. Clematis Gouriana *(Roxb.)* climbing: leaves pinnate or bipinnate; leaflets ovate-lanceolate, acuminated, cordate at the base, 3-or obscurely 5-nerved, entire or with a few coarse serratures: young branches angled, and peduncles, and oblong achenia pubescent: sepals revolute.— *W. and A. Prod. p.* 2.

This beautiful species flowers during the cool season. At this time, January, it is in full bloom in the jungles below Coonoor, where it may be seen climbing to the tops of the highest trees completely covering them with such a profusion of white flowers as almost to conceal the tree that supports them. In Mysore it is of frequent occurrence in the dense thickets surrounding most of the hamlets of that province.

3. Clematis Wightiana *(Wall.)* climbing: leaves pinnate; leaflets not wrinkled, very villous and soft on both sides, coarsely serrated, cordate at the base, palmately 3-lobed, the middle lobe the longest, or divided again into 3 ovate-lanceolate segments: young branches, peduncles, and flat achenia, pubescent: sepals ovate, outside very pubescent, inside glabrous: filaments hairy.— *W. and A. Prod. p.* 2.

This species is less frequent than the preceding, but is abundant among the brushwood of clumps of jungle about Ootacamund: also on the road side above Kaity and on that leading from Southdown round the foot of Elk Hill. In the latter station I met with it in the greatest perfection. It is readily distinguished by its soft almost woolly pale green leaves.

I may here remark that the colourist has represented them of too deep a green, for which, however, I can scarcely blame him as I found it very difficult to obtain the proper tint.

Rungiah, del. Dumphy, lith.

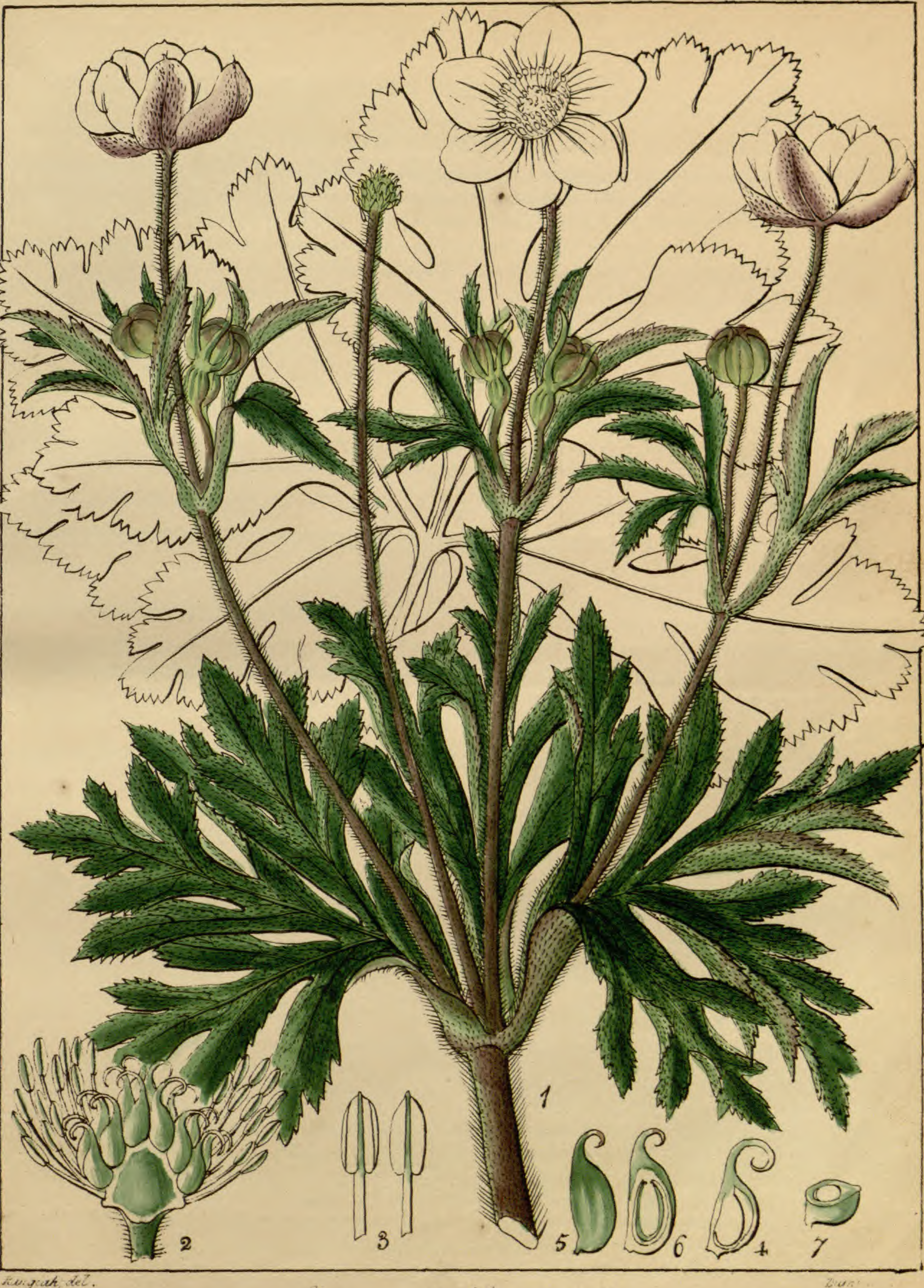
Clematis Gouriana (Roxb)

Rungiah, del. Dumphy, Lith.

Clematis Gouriana (Roxb)

Rungiah, del. Dumphy lith.

Clematis Wightiana (Wall)



R. Wight, del. Dun

Anemone Wightiana (Wall)

ANEMONE. *Wind Flower.*

Involucre 3-leaved, distant from the flower, the leaflets variously cut. Sepals 5-15, petaloid, imbricated in æstivation. Petals 0. Stamens numerous. Achenia numerous. Seed Pendulous.—Herbaceous plants with a perennial root. Leaves radical, stalked, more or less cut or lobed. Scape, when branched, bearing involucres at each of its divisions.

Of this genus nearly 100 species have been described in recent Botanical works. They are for the most part herbacious with perennial roots, and, generally, can be at once distinguished by their flowers having no distinct calyx, the floral leaves being all petaloid : hence it is called a petaloid calyx. By this mark as well as by habit, or general appearance, they are readily distinguished from their next neighbour in the Botanical system, Ranunculus, which has a regularly formed Calyx and Corolla.

Some of them are much cultivated in gardens and under the operation of skilful horticulture have become so completely doubled, that all the stamens and pistils have been changed into petals. In this state, however monstrous in the estimation of Botanists, they are certainly most beautiful objects and deservedly great favourites in the eyes of the florist : many of them, especially the *Anemone coronaria*, when in that state, being variegated with the richest tints. Under such a course of treatment it appears to me, the one here figured might be made to undergo that change and become one of the most choice garden flowers to be met with on its native mountains. This change might probably be brought about by transferring roots to the rich soil of the garden and preventing them, flowering for a season or two, by the simple operation of stopping, a practice which has the effect of strengthening the roots. At the end of the season when the leaves wither, they should be taken up and kept for a few weeks in a dark place, and again planted. As the roots are perennial this practice would probably in a few seasons effect the desired change, after which they can be propagated by dividing the root. For obtaining new varieties, plants are raised from seed, taken either from single or partially double flowers, and treated as above, taking up the roots when the leaves wither.

4. ANEMONE WIGHTIANA *(Wall.)* clothed with silky hairs : leaves on very long petioles, tripartite ; divisions very deeply 3-cleft ; segments cuneate, deeply 3-lobed ; lobes cuneate, irregularly inciso-serrated : involucral leaves subsessile, deeply 3-cleft; divisions 3-cleft; segments linear-oblong, cut and serrated ; sepals 6-8, elliptic-oblong : achenia glabrous : style hooked, persistent.—*W. and A. Prod. p.* 3.

Frequent in pastures about Ootacamund, but also generally distributed over the hills. Flowering in May and June. Flowers white within purple exteriorly. During these months it is certainly one of the greatest ornaments of the hills. I have not heard of its being applied to any useful purpose, though it may not be destitute of useful qualities as some of them are known to possess these.

RANUNCULUS. *Butter Cup. Crow-foot.*

Sepals 5, not free at the base, deciduous, imbricated in æstivation. Petals 5, rarely 10 or more, the claw furnished inside with a nectariferous concave little scale. Stamens and styles numerous. Achenia ovate, pointed, somewhat compressed. Seed erect—Herbaceous plants with annual or perennial roots. Leaves mostly radical ; cauline ones placed at the base of the branches and peduncles.

This genus ranks very near the former in the Botanical system agreeing with it in its herbacious character, its perennial roots, the form of its flowers, and structure of its seed, but differs in having a perfect Calyx and Corolla, in place of a petaloid or corolla-like calyx, and the seed erect, not suspended in their cells as in Anemone. Like *Anemones* these plants frequent pastures, shady woods, and moist soils near water, and they equally, but more energetically, participate in the acrid properties of the family. Like them under proper cultivation they become double, and in that state are equally prized as garden ornaments. Of those found on these Hills only one, *Ranunculus reniformis*, seems well adapted for the garden. It grows in open pastures, has thick fleshy roots, is naturally furnished with numerous petals, about 12, and, probably, treated as above would soon shew a tendency to increase the number.

The *Ranunculus* when thoroughly doubled is a fine flower, especially when richly variegated. Formerly they were in much greater repute as garden ornaments than in the present day, when gardens are stocked with such a multiplicity of new flowers brought from all parts of the world, but I almost doubt whether the lovers of fine flowers have not sustained a loss in discarding them to so great an extent as they have done from the Flower border : and I should not be surprised, ere long, to see them again taken into favour when the fashion for the large and gaudy Dahlia and such like has somewhat abated, and that for more modest, but not less beautiful, objects has resumed its place among the admirers of really fine flowers. Of this I, at all events, feel quite certain, that I have never on the Neilgherries seen a Dahlia that would bear comparison with Ranunculuses and Anemones I have seen in even second rate Cottager's gardens in England.

5. RANUNCULUS WALLICHIANUS *(W. and A.)* erect, hairy : radical leaves roundish ovate, rounded or somewhat cordate at the base, coarsely crenated ; lowest scape-leaf oblong, toothed, narrowed at the base into a petiole ; upper ones nearly linear : petals (yellow) numerous, 10-13, twice as long as the patulous calyx : heads of fruit globose : achenia oblong, tumid, minutely dotted : style nearly straight.— *W. and A. Prod. p.* 4.

This species is generally met with in moist woods, is of a procumbent habit, with small flowers, flowering in May and June after the rains of the South-west monsoon have commenced. It is however found at other seasons, especially during rainy weather. Another species is found at the same season and so much resembling this one, that, to the unpractised eye, it is not distinguishable, but is at once known by the seed, which, in this, is furnished with numerous little tubercles, in that, is quite smooth and without asperities of any kind.

II. MAGNOLIACEÆ.—*Champ, Champac.—Champany.*

The species of this family are for the most part large trees or shrubs, forming a remarkable contrast with those of the preceding family, and on this account apparently most unnaturally grooped almost side by side with it. And yet the ablest Botanists who have given their attention to the grooping of natural families, so as to form a series in which those most nearly associated by the structure of their flowers and fruit should stand nearest each other, have hitherto failed in discovering for it a more suitable place in the vegetable system, a fact not to be much wondered at, as in the structure of their flowers and fruit, the two families so nearly associate that, but for other circumstances, Magnolias might almost be looked upon as gigantic Arboreous Ranunculuses.

The bulk of this family are natives of North America, a few only being found in Asia, and none, so far as is yet known, in Europe or Africa. Several are found in China and Japan, a few in the Himalayah range, three or four in Ceylon, and two or three on the mountains of the Indian peninsula. Generally they are distinguished by the fragrance of their flowers, which has led to the introduction, and extended diffusion over India, of the Champac as a sacred tree the flowers of which, when procurable, are offered by the natives at the shrines of their Idols.

The tree here represented is the only one found on the Neilgherries and there attains the size of a large timber tree the wood of which however is only used in house building. Owing to its hygrometric properties it is not adapted for other purposes as it swells and contracts, according to the moisture or dryness of the atmosphere, to an unusual extent, even after long seasoning. When formerly writing on this family in my Illustrations of India Botany, I considered this distinct from the plant there figured under the name of *M. Palmyensis*, better acquaintance with this one, has led me to doubt the correctness of the opinion there expressed which was mainly formed on what I now find an incorrect figure and description.

MICHELIA. *Linn.*

Carpels arranged in a loose spike, of a consistence between leathery and fleshy, 2-valved, opening from the apex downwards. Seeds several (3-8), externally fleshy.—Trees. Leaves entire, petioled. Flowers axillary, generally fragrant, usually of a yellow colour.— *W. and A. Prod. p.* 6, *No.* 1.

This genus which is the only one of the family found so far south in India consists of large trees or considerable shrubs and may I believe generally be met with, where abundant, in flower nearly the whole year, but on the Hills are in greatest profusion during the rainy season. The flowers are usually rather large frequently with a tinge of yellow very fragrant. Those of the Neilgherry species are nearly white.

M. NILAGIRACA. *(Zenker)* Leaves illeptic oblong tapering to a point at both ends, glabrous ; stipules and spathes silky petals from 9 in three rows stamens numerous shorter than the column of fructification, ovaries numerous, about 4 ovules in each : carpels warty, one or two seeded,

A large tree found frequent in the clumps of Jungle about Ootacamund. There are several very fine ones in the thicket immediately adjoining the Church the branches of one or two of them overhanging the road.

Rungiah del. Dumphy, Lith.

Ranunculus Wallichianus (W & A)

Rungiah del. Dumphy Lith.

Michelia Nilagirica (Zenker)

Kunyah, del.   *Clypea hernandifolia (W & A)*   Dumphy, Lith.

III. MENISPERMACEÆ.

This curious family consists, with few exceptions, of twining shrubs and is nearly confined to Asia and America, a few only having been found in other tropical countries. One is found above 3,000 feet of elevation on the Himalayas and one in Siberia. These I believe are about the only exceptions to its tropical character, doubtless others are found beyond the tropics, but still in warm latitudes where frost is scarcely known. The one here represented has the widest range of elevation of any I have met with in the Peninsula, ascending from the plains even to Ootacamund, where it is found in almost every thicket. One other species I have found on the Hills and only there, but so rare that I have only once seen it and then not in good flower, otherwise it would have been a more appropriate representative of the family for this work.

The order is in many respects peculiar and seems hitherto to have nearly set at defiance all attempts of Botanists to find a suitable location for it in the natural arrangement of the vegetable kingdom. I here retain it in the situation allotted by that most accomplished Botanist, Professor DeCandolle, though satisfied in my own mind it is not well chosen, from feeling convinced that premature and partial reforms are productive of greater injury to science than the errors they are intended to remedy.

Intense bitterness more or less combined with narcotism is the prominent quality of the Order as evinced by the well known Colombo root, and the notorious Cocculus Indicus in which the bitter principle of the family is combined with a less innocent narcotic property which it is said London Brewers impart to their Porter.

CLYPEA.

Diœcious. Calyx of 6 sepals in a double series, with 3-6 close pressed bracteoles. Corolla none MALE. Stamens united into a central column, dilated at the apex, bearing several 2-celled anthers; cell opening horizontally, placed end to end, and forming a ring round the top of the column. FEM. Ovary solitary. Stigmata 3 (or rarely 6 ?) Drupe obliquely reniform; nut compressed, wrinkled round the margin Seed solitary, uncinate. Albumen fleshy. Embryo terete, of the same shape, and about as long as the seed —Twining shrubs. Leaves peltate. Panicles axillary, both male and female without cordate bracteas.— *W. and A. Prod p.* 14, *No.* II.

This genus is one of four or five appertaining to this family found in the Indian Peninsula and is easily distinguished from its congeners by its male flowers, the stamens of which are united into a single column forming at top a large capitate anther which opens round the upper margin for the transmission of the pollen. The flowers of this like those of the preceding order belong to the ternary form, that is, are composed of one or more whorls, each having three leaves. In this instance three such are shown in the diagram fig 8, while the centre ring may be supposed to consist of either one or two such verticels. In Cocculus there are 2 whorls of stamens each having a scale at the base, in this there are only three scales (fig 3) surroundin the column hence it seems probable that one whorl only unites to form the compound stamen.

CLYPEA *hernandifolia.* (W. & A. :)—Leaves ovate, rounded or scarcely truncate at the base, mucronulate, upper side glabrous, under slightly hairy: panicles about equal to the petioles, umbelliform; rays umbelliferous; pedicels very short: polleniferous ring 6-celled·—*W. and A. Prod. p.* 14.

Frequent twining among underwood, in the clumps of jungle about Ootacamund particularly in low moist situations—It is equally frequent in similar situations on the Pulney mountains, but also occurs on the plains in moist shady jungles.

IV. BERBERIDEÆ.—*Barberry.*

This is a small family of finely flowering shrubs, natives of the temperate regions of both the Northern and Southern hemisphere. In the Indian Peninsula two species certainly occur, a third is said to be found in the Coorg jungles, but on that point there still seems room for doubt. Both are found on the Neilgherries, the one here represented being by far the handsomer of the two. Other nine genera are referred to the order but this is the only one found in Southern Indian. The peculiar distinguishing mark by which this family is separated from the rest of the vegetable kingdom is the curious anthers, which open like the lid of a snuff box to give exit to the Pollen, combined with a very perfect flower. The cinnamon tribe (*Laurinæ*) have similar anthers but very incomplete flowers in comparison with those of *Berberideæ*, and are in consequence far removed from them in our linear series of natural orders, but, notwithstanding, they have many points in common, showing a closer relationship than might at first sight be suspected—among these are the ternary arrangement of the flowers, the valved anthers, and single superior ovary.

The filaments of some, if not all the species, of this genus are endowed with a peculiar irritability, which causes them when touched at a certain point near the base to contract elastically and strike the anther against the stigma and in that way scatter their pollen on it. This property exists in both the Neilgherry plants. The properties of the wood are mildly astringent and bitter, and in the upper provinces an extract is prepared by boiling the wood which is highly esteemed by the natives on account of its medicinal qualities. In upper Bengal the fruit of two species are dried, like raisins in the sun, and sold as kistmisses in the bazars all over the country.

BERBERIS.—*Barberry.*

Sepals 3-4-6, deciduous, in a double row, accompanied externally with petaloid scales. Petals hypogynous, equal to the sepals in number and opposite to them, or twice as many ; often furnished in the inside with an appendage at the base. Stamens hypogynous, equal in number to the petals and opposite to them : anthers bilocular, the cells opening elastically with a valve from the bottom to the top. Ovarium solitary, unilocular, containing 2-12 ovules, which are erect, or attached laterally to the inner margin, and forming there one or two rows : style sometimes lateral, short : stigma orbicular. Fruit baccate or capsular, indehiscent. Albumen fleshy or horney. Embryo straight, in the axis of the albumen : radicle pointing to the hilum : cotyledons flat.—Leaves alternate, without stipules.—*W. and A. Prod. p.* 15 *No.* I.

The species of this genus, amounting to about 50, are nearly all shrubs or at most small trees armed either on their stems or leaves with numerous thorns. In those with thorny stems the thorns are considered a modified state of the leaves in which the parenchema or dilated portion is displaced and the ribs or veins have become indurated. Some Botanists propose dividing it, removing the plant here figured along with some others to form the genius *Myhonia* which however only differs in the petals wanting two glands at the base which the others have, a character considered altogether insufficient for the purpose. On this account the older name is here preserved All the plants of this section of the genus are very handsome shrubs. The one figured is common on the hills and when growing in favourable situations attains the size of a small tree A pale yellow dye is extracted from the wood of both the Hill species, a third species belonging to the Mahonia division with drooping racemes of flowers is, I am told, found in Coorg, and which I think I once saw

Rungiah, del. Dumphy, lith.

Berberis Leschenaultii (D.C)

on the Pulney Mountains but not then in flower. The Pulney plant differs in habit from this in having diffuse rambling branches.

BERBERIS (MAHONIA) LESCHENAULTII (WALL)—Leaves pinnate ; leaflets about six pair, ovate, nearly equal in size, slightly cordate at the base, repand with 6-8 thorny teeth at each side, about 5-nerved at the base ; lower pair of leaflets close to the stem : racemes elongated, slender ; bracteoles at the base of the pedicel oblong, obtuse: petals with two distinct glands ; filaments without teeth :erry globose, crowned with the evident style and stigma.—*W. and A. Prod. p.* 16.

As this is a true congener of Nuttal's genus *Mahonia* I preserve that as a subgeneric or sectional name. The plant is found in almost every clump of jungle about Ootacamund flowering during the South west monsoon but may generally be met with in-flower at other seasons though more rarely, the fruit ripens during the dry season and when fully ripe acquire a bluish purple colour.

V.—CRUCIFERÆ.—*Cabbage Tribe.*

This large and most useful family of plants, supplies man with many of his most esteemed esculents, among which may be named the whole tribe of cabbages, turnips, rape, mustard, cress, scury grass, radish, horse radish, &c., and to the flower garden, wall flowers, stocks, candy tuft, honesty and many others. But though it thus abounds in both useful and ornamental plants in the temperate regions of the globe, it scarcely merits a place in this work, three or four insignificant species being all that are found here where the one figured is the best looking of the set. Such being the case it seems useless to dilate on a family that can possess so little interest for the lovers of the wild flowers of our Blue-mountains. Though thus rare, even in this temperate climate, the family is a large one including little short of 1,500 species. A few however are found in warmer climates, the most curious and interesting of which is the so called *Rose of Jericho* (*Anastatica* literally resurrection flower) a native of the sandy deserts of Arabia, the ends of the branches of which contract during dry weather and form a ball which may be taken up and kept in that state for years. And at the end of that time, if the roots are immersed in water will re-expand, the flowers open, and in a few hours the whole plant appear as if it had never been out of the ground.

The family derives its name from the Latin word *Crux crucis* a cross with reference to the four petals spreading in opposite directions so as to form the appearance of a St. Andrew's cross, and by this mark they may always be known at a glance. They have besides six stamens four long and two short whence Linnœus derived his name Tetradenamea that is four powers, in allusion to the four long stamens.

CARDAMINE.—*Ladies Smock.*

Calyx connivent or somewhat patent, equal at the base. Petals with a claw ; limb entire. Stamens distinct, without teeth. Siliqua sessile, linear, elongated, compressed ; valves flat, nerveless, somewhat smaller than the incrassated replum,* from which they usually separate elastically. Style short, or none : stigma nearly simple. Seeds ovate, without a border, forming a single series : podosperms slender. Radicle applied to the edge of the cotyledons (o=)—Leaves petioled, entire, lobed, or variously divided, often different on the same individual. Flowers white or rose-coloured.—*W. and A. Prod. p.* 19.

The species of this genus are very numerous and where they abound very ornamental, as for

* *Replum* is the frame surrounding the dissepiment, from which the valves fall off, and to which the placentæ are attached.

example the *C. pratinses* of English meadows, which, in spring, appear in such numbers as to whiten the fields where they grow, so as to give the appearance of bleaching greens ; whence, it is supposed, it derived its English name of "Lady's Smock." The one here figured does not possess that recommendation, as it usually occurs but thinly scattered in woods and may generally be found in flower during wet weather at all seasons.

CARDAMINE BARBONICA (Persoon).—Leaves trifoliolate ; leaflets hairy on both sides, particularly on the nerves beneath, petioled, ovate acuminated, unequal at the base, irregularly and sharply toothed, terminal one sometimes 3-lobed or divided into 3 leaflets similar to the others : siliqua erect.—*W. and A. Prod. p.* 20.

VI.—FLACOURTIANEÆ.

This is a small family of trees and shrubs, but on the limits of which considerable difference of opinion exists among Botanists, a subject on which much might be said were this the place for such disquisitions. Suffice it therefore to say that there are two nearly related families (*Bixaceæ* and *Flacourtianeæ*) which many Botanists consider quite distinct, but which others combine to form one large one. The preponderance of opinion is on the side of those who keep them distinct ; but they, on the other hand, differ among themselves as to the genera that should be respectively referred to each, a fact which seems to indicate a degree of affinity quite consistent with their union and redivision into suborders, the course which Professor Endlicher has adopted in his Genera Plantarum. Mr. Bennett (Plantæ Javanicæ Rariores) has in a long and very elaborate article, under *Phoboros rhinanthera,* undertaken to throw more light on the subject and to reconcile the differences existing among Botanical writers on these two families : but after a copious adduction of evidence on all sides, has forgot to sum up, and, consequently, has left the question involved in about as great darkness as when he commenced. I learn however from a careful perusal of that article—1st, That Mr. Brown coincides with Dr. Blume in considering the genus *Hydnocarpus* as forming the type of a new order, to which the latter Botanist has given the name *Pangiaceæ* ; derived from *Pangium* an old generic name of Rumphius.—2nd, That he agrees in opinion with those Botanists who think the two families ought to be combined, a view in which I can scarcely coincide, on his own showing, as he states the ovary of Flacourtia has several cells, with central ovules, while those of all the other genera have one-celled ovaries and parietal ovules, as in the accompanying figure. For this reason I conceive the order *Flacourtianeæ* should be retained, even though limited to the single genus *Flacourtia.* But supposing this difficulty got over by finding the partitions more or less inconstant, still I cannot help thinking the association of numerous plants having dry dehiscing capsules with others, equally numerous, having indehiscent baccate fruit, one that ought when possible to be avoided and that all those genera agreeing with *Bixa* in having capsular fruit ought to be brought together to form the order *Bixaceæ* while those with baccate fruit are ranged under the old *Flacourtianeæ.* Should this last course be adopted then the present genus can scarcely be retained, as at present placed, at the end of *Flacourtianeæ* from which it essentially differs in its fruit, being a many seeded nut, in place of a fleshy berry, but is left here until the question is decided one way or the other.

Little can be said regarding the uses or properties of *Flacourtianeæ.* The fruit of one or two species of *Flacourtia* are about the size of a cherry, and very palatable. In Ceylon

Rainguet del.

Cardamine Borbonica

Hydnocarpus alpinus, R.W.

Dunphy, lith.

the berries of *F. inermis* are made into preserves. The seeds of *Hydnocarpus inebrians* have the property of intoxicating fish when thrown into water where they are—hence the name.

HYDNOCARPUS.

Flowers diœcious. Sepals 5 ; the two outer ones ovate; the three inner much larger, exceedingly concave, somewhat petaloid ; æstivation twisted. Petals 5, æstivation twisted. Scales (abortive stamens ?) opposite the petals somewhat fleshy, MALE. Stamens 5, in the centre of the flower ; anthers flattish, nearly reniform ; cells separated by the broad connectivum. No vestiges of a pistil. FEM. Stamens as in the male, but anthers without pollen. Stile 0. Stigma peltate, flat, closely pressed on the summit of the ovary and crowning it, 5-parted ; each segment cuneate and deeply bifid. Ovarium globose ; ovules numerous. Berry globose, crowned with the undivided portion of the stigma now thickened and erect (resembling a short stout style) and bearing the remains of its lobes. Seeds numerous.—Trees. Leaves glabrous ; secondary nerves simple, connected with transverse small nearly simple and straight veins.—*W. and A. Prod slightly altered*

Until the discovery of the subject of the accompanying plate, this genus consisted of a single species the *H. inebrians:* a tree widely distributed over the shores of India and Ceylon. It is also said to be a native of the Eastern Islands, extending from Malabar Eastwards as far as Amboyna and Java, where we are informed it was found and described under the name of *Pangium* by Rumphius. It seems not improbable however that when Rumphius' *Pangium* is better known it will be found generically distinct as Roxburgh's *Gynocardia* assuredly is, though referred here by both Lindley and Endlicher. The one here figured so greatly resembles in general appearance the coast tree, that for a long time I thought them the same and felt greatly surprised at finding a coast tree at an elevation of 6,000 feet. This it was that first led me carefully to compare the two, when the difference in the structure of the flowers at once became evident and showed they could not be the same. In that two of the sepals are much smaller than the others, in this they are all equal : in that the petals are broad ovate fringed with hair, in this they are lanceolate and glabrous : in that the petals are furnished with a short broad densely hairy oval scale, in this the scales are linear lanceolate nearly as long as the petals, and merely ciliate, or fringed with short fine hairs : in that the stamens have long subulate hairy filaments recurved at the apex, in this they are short and glabrous : in that the anthers are short and reniform in this ovate oblong : in that the leaves are serrated marked below with numerous prominent veins, in this they are quite entire with few veins. This comparison might be carried further but enough has been said to show that they are amply distinct species.

Roxburgh's *Gynocardia* or *Caulmoorga* (the two names refer to the same plant), quite a distinct genus, has been, by both Lindley and Endlicher, erroneously, referred here as a synonym, and is by Meisner altogether over-looked or excluded from the order. Rumphius' *Pangium* has also been referred here by Endlicher but with what justice I have still to learn, for there is nothing in either his figure or description to justify such lumping, unless, which is probable enough, Blume has supplied what is wanting in Rumphiu's description to authorize its reduction to a synonym.

HYDNOCARPUS ALPINUS (R. W.)—Sepals all equal reflexed : petals ovate lanceolate glabrous : scales linear lanceolate as long as the petals, ciliated towards the apex : male-stamens 5, filaments much shorter than the petals, glabrous, anthers, obtuse pistil none : female-calyx corolla and stamens as in the male, but the anthers without pollen : style none : stigma peltate 5 parted, the divisions obcordate spreading, crowning the ovary.

A large ramous tree 70 to 100 feet high, not unfrequent in deep moist vallies of the Neilgherry hills about Koonoor and Kottergherry usually growing on the banks of streams. Flowering in July and August. Leaves alternate, ovate-acuminate entire glabrous, from four to six inches long and from 1 to 2 inches broad, at first red, afterwards deep green : fruit globose, about the size of an apple ; clothed with short brown tomentum : seeds enclosed in a white fleshy pulp ; testa dark coloured, hard ; embryo enclosed in albumen, cotyledons foliaceous cordiform ; radicle elongated pointing to the hilum.

H. INEBRIANS (*Vahl*) Sepals unequal, the three inner ones longer : petals broad ovate, fringed with soft white hairs : scales broad ovate, about half the length of the petals, densely hairy ; stamens as long as the petals, filaments subulate, anthers broad reniform : pistil none : female as in the male, anthers without pollen.—*W. and A. Prod. p.* 30 : *Wight's Illust.* 1 *tab.* 16.

A tree of moderate size frequent near the coast in Malabar and Ceylon, flowering at all seasons. Leaves alternate, ovate, acuminate, glabrous, crenulately serrated about 5 or 6 inches long and 1 to 2 inches broad : racemes axillary, short, few flowered fruit globose many-seeded.

VII.—VIOLARIEÆ.—Violet Tribe.

This, like the preceding family, consists for the most part of extra-tropical plants, a few only being found of strictly tropical origin. By far the greater portion of its species are herbaceous or low half shrubby plants, but larger shrubs or even small trees also occupy a place in its ranks. One of the latter is found in Ceylon, and most probably also on the continent, though I have as yet failed to recognize it. Of the truly tropical forms, two species are found inCoromandel,small decumbent plants with pink flowers,but so unlike the tree violet and heart's-ease, that no one unacquainted with the formation of these flowers could recognize their relationship. Others grow on the Andes in Peru still more unlike, andso much resembling a Stone-crop in the form of the plant that, not even an acute Botanist would, without the flowers and seed vessel, suspect them to be violets even in the Botanical sense of the term, which is much wider than common parlance admits. In common language, we have *the* violet (*Viola odorata*) the Dog violet (*Viola canina*) and a few others, but some florists do not admit that the Heart's-ease (*Viola tricolor*) is a violet, though one of the most perfect of the genus.

The Violacious plants form a numerous family, amounting to nearly 500 species. These are scattered over nearly the whole globe, but very sparingly in India. North America and Europe are their two grand centres, but they are also numerous in South America, both on the mountains and plains. On the Andes they present the appearance of small-rounded leafy little shrubs, not unlike some of the European stone crops (*sedum*), in Brazil shrubby and small arborious forms prevail. True violets are however of rare occurrence in the latter country.

VIOLA.—*Violet.*

Sepals five, persistent; æstivation imbricated. Petals hypogynous, five, usually withering, generally unequal; æstivation obliquely convolute. Stamens five, alternate with the petals, or occasionally opposite to them, inserted on the hypogynous disc or torus: anthers bilocular, introrse, closely approximated or united laterally to each other: filaments dilated, elongated beyond the anthers; two of them, in the irregular flowers, usually with an appendage at the base. Ovary 1-celled, with many (rarely one) ovules: style single, usually declinate, with an oblique cucullate stigma. Capsule three-valved, loculicide, bearing the placenta on the middle of the valves. Embryo straight, erect, in the axis of a fleshy albumen.—Leaves alternate, rarely opposite, with persistent stipules and an involute vernation.—*W. and A. Prod.* p. 31.

This genus includes at the present time upwards of 150 species. These for the most part are low growing herbaceous perennial plants, some, however, show a shrubby tendency. Two or three are found on the Neilgherries, but the one here figured is by far the most common, showing its pale blue flowers among the gras sin all directions, rapidly propagating itself by means of runners, like strawberries. By an oversight of the draftsman, and want of room, these have not been introduced, and to that extent the figure is imperfect, but in other respects gives a good idea of the plant. It is in flower at all seasons. In general appearance this species much resembles the sweet scented violet but is destitute of fragrance. Of all the long list of species of this genus only two or three species are cultivated in the flower garden, namely, the Pansy or Heart's-ease (*Viola tricolor*) and the sweet scented violet (*Viola odorata*) the former most justly esteemed for the admirable blending of its colours, and the latter for its charming fragrance. There are many varieties of both in cultivation. The *Viola tricolor* derives its English name *Pansy* from the French "pensée" the meaning of which is alluded to by Shakspeare when he says "There's Pansies that's for thought."

Rungiah del. Dumphy, Lith.

Viola Wightiana (Wall)

VIOLA WIGHTIANA (Wall.) stoloniferous, slightly hairy : leaves cordate-ovate, crenated : sepals lanceolate : somewhat acute ; spur short, very blunt : torus flattish : style attenuated downwards, stigma rostrate, convex but not hooked, neither margined nor papillose : fruit globose.—*W. and A. Prod, page* 32.

A humble plant common on the Neilgherries, flowering at all seasons. In general appearance as well as in Botanical characters very nearly allied to *V. odorata* but at once, in the growing plant, distinguished by its being destitute of its sweet scent.

VIII.—DROSERCEÆ.—SUN DEW TRIBE.

This is a small but curious order, the species usually frequenting moist swampy ground, but this is not constant as one of the Neilgherry species (*Drosera peltata*) is frequently found on the dry slopes of the hills, but then only during the rainy season showing that this departure from the character of the family is but partial.

Viewed as a whole, this family may well be called cosmopolite, as they are found in nearly all countries and climates. This peculiarity of extensive distribution is not unfrequent among aquatic and marsh plants and is well exemplified in the accompanying species of *Drosera,* which I have gathered on the banks of the Adyar at Madras, and in the most elevated marshes of the Neilgherries, fully 8,000 feet above the sea. The Parnassias, on the other hand, are more tenacious of a cool climate, not one having hitherto been found in Southern India on a lower level than the table land of Mysore. The one here figured I have only met with on the Neilgherries, and there only in the swamps and bogs of the higher ranges, as about Ootacamund, where it is not unfrequent during the rainy season.

As in the case of *Flacourtianeæ* much difference exists among Botanists as to the place *Droseraceæ* should occupy in the natural series and whether *Drosera* and *Parnassia* should be united in the same order, my own impression is in favour of retaining them as now placed, which is certainly sufficiently in accordance with what is called technical characters, though it is not improbable that, when more deeply and skilfully scrutinized with the aid of a good microscope, differences of structure might be discovered, demanding the separation of the two suborders, of which it is now made up, and their elevation to the rank of distinct orders.

The Droseras are all remarkable on account of their Fern like vernation, that is, the leaves are rolled up in the bud like the mainspring of a watch and gradually unroll as they grow, they are further remarkable on account of the glandular hairs with which their leaves are furnished, which secretes the viscid juice or dew with which each is tipped, and has procured for them the English name of Sundew. In this dew insects which happen to settle on them are entangled, while the leaves contract and retain them. One species (*Dionæa muscicapa*) familiarly known by the name of Venus' fly trap, possesses the property of irritability in a very remarkable degree. It has two-lobed leaves, the margins of which are set round with bristles and a few scattered on the surface. The moment a fly or any other insect that may have settled on the leaf touches these middle hairs, the lobes instantly contract on the intruder and remain contracted so long as it lives and excites, by its struggles to get away, the irritability of the leaf. It appears from the experiments of Mr. Knight of Chelsea, that the plant in some way derives nourishment from the insects so caught.

DROSEREA.—*Sun Dew.*

Sepals 5, persistent, equal : æstivation, imbricative. Petals 5, hypogynous. Stamens hypogynous, distinct, withering, five and alternate with the petals or ten : anthers bilocular, bursting longitudinally. Ovary one : styles 3-5, slightly connected at the base or distinct, bifid or branched. Capsule 3-5-valved, oculicide, 1-celled, or spuriously 3-celled, the dissepiments being formed by the placentas meeting in the axis. Seeds without an arilles : testa sometimes loose and distinct from the tegmen. Embryo straight erect, in the axis of a fleshy or cartilaginous albumen.—Leaves alternate, furnished with glandular hairs, with a circinate vernation. Stipules in the form of ciliæ at the base of the petioles.—*W. and A. Prod.*

Of this genus there are now above 60 species described, but none of them possessing much interest except to the Botanist as they are generally inconspicuous plants of difficult cultivation, if indeed they can be cultivated at all. D. peltata. One of the two species found on the Hills is also a native of New Holland. The one figured is very common in the swampy grounds about Ootacamund, but requires to be looked for as it is generally concealed by the herbage among which it grows.

Drosera Burmanni (*Vahl* :) stemless : leaves all radical, obovate-cuneate, sessile, veins reticulated ; scapes erect, and the calyx glabrous : seed-coat not arilliform.—*W. and A. Prod. p.* 34.

A low growing stemless plant, inhabiting swampy ground. On the hills it is usually to be met with in flower at all seasons, but in greatest perfection during the summer months. The clump of plants represented were selected to show the manner of its growth, but unfortunately were unavoidably not taken at the best season, and do no ttherefore show it to the best advantage, though it conveys a good idea of its habit as seen growing.

PARNASSIA.—*Grass of Parnassus.*

Stamens 10 ; 5 fertile ; 5 sterile, opposite the claws of the petals. Stigmata 3-4 sessile. Capsule 4-valved.—Quite glabrous, herbaceous, bog plants. Leaves radical, petioled. Scape with one sessile foliaceous bractea or rarely naked, dilated immediately under the flower.—*W. and A. Prod.*

The European *Parnassia palustris* is supposed to be the plant referred to by Dioscorides as the grass of Parnassus, hence the name has been retained for the genus which now includes about 12 species, five of which are natives of India. Dr. Zinker has published a figure of this plant under the name of *P. Schmidelii* in his figures of Indian plants, not being aware at the time that it had been already described.

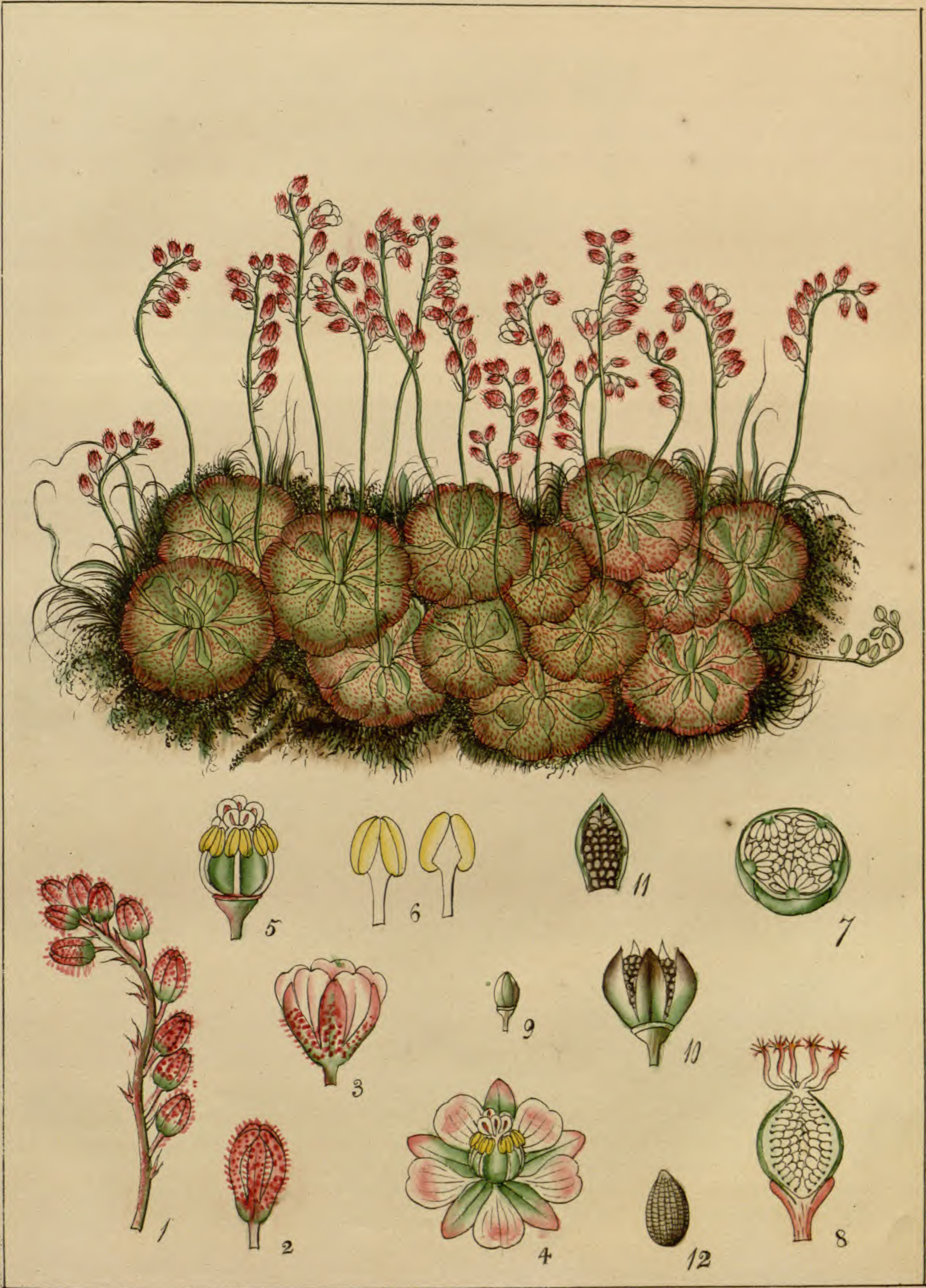
The genus is readily recognised by the yellow glandular bodies situated between the stamens, and by sessile the floral leaf situated on the middle of the flower stalk.

Parnassia Wightiana (Wall.:) leaves broadly cordate-ovate or slightly reniform ; sinus slightly rounded : bractea like the leaves, embracing the scape : petals obovate-oblong, their lower half having the margin cut into numerous slender linear simple or forked segments resembling a fringe ; unguis very short, broade and cuneate : sterile stamens about as long as the fertile, cleft upwards into 3-5 stout horn-like segments that are glandular at the point. —*W. and A. Prod. p.* 35.

A low growing herbaceous plant, abounding in almost every swamp which, during the rainy season they ornament with their numerous rather showy flowers, in general appearance somewhat resembling Butter cups but differing in having the flowers pure white in place of yellow, the prevailing colour of Ranunculus. In *Parnassia palustris* there are four stigmas and 4 lines of seed within the ovary, in this there are only three, this, independent of other marks, affording a certain and easily observed distinction between these otherwise very nearly allied species.

IX.—POLYGALEÆ Milk-wort Tribe.

This is a large and rapidly increasing family ; within the last 20 years the number of its species has been nearly doubled : like the preceding it is truly cosmopolite in its distribution, species in some form being met with in all climates. Of the increase, the genus



Rungiah del. Dumphy Lith.

Drosera Burmanni (Vahl.)

Rungiah del. Dumphy Lith.

Parnassia Wightiana (Wall)

Rungiah, del.

Dumphy, lith.

Polygala arillata (Ham)

Polygala has had a large share. When DeCandolle published the first volume of his Prodromus in 1824, he described 164 species, 30 of which were imperfectly known. In 1842 Walpers, in his supplement to that work, enumerates 120, only twelve of which had been referred to in the original work.

This order is as universal in the forms it assumes as in its distribution, for here we find the minute S*alomonia* not three inches high, and the umbrageous X*anthochymus,* a good sized tree, besides many large shrubs. Among the Polygala's proper, in like manner, we have some not exceeding a few inches, and rising thence step by step through all grades to the *P. arillata,* here figured, which I have seen in the sheltered woods of the Neilgherries nearly 20 feet high. The Indian Polygalas except the last are for the most part small, having little beauty to recommend them to the notice of the florist, many of those from the Cape are, on the contrary, most showy, and are found in many of the Hill gardens under the name of CapeBroom and such like misnomers. One of the finest has large Lilac coloured flowers. The one here figured might, I think, be advantageously added to the short list of cultivated species.

A few species only of this order have been made available to human wants. The snake root (*Polygala* S*enega*) of America and the *Polygala crotalarioides* of the Himalays have both got the credit, among the natives of their respective countries, of being an antidote to the poison of the snakes. Most of the species are bitter and probably, more or less laxative as is the case with *P. amara* which was formerly occasionally used in medicine but is now held in small repute.

POLYGALA.—*Milk wort.*

Sepals 5, persistent, the *alæ* large and petaloid. Petals 3; their claws all united with the staminiferous tube, the lower one (*carina*) keel-shaped, the two additional ones abortive. Stamens united into a tube at the base, which is cleft in front : anthers opening by a pore. Ovarium 2-celled ; ovules solitary, pendulous from the apex of the cell. Capsule 2-locular, loculicide, compressed. Seeds pendulous from the apex of the cells, pubescent, with a carunculate arillus at the hilum : albumen abundant, fleshy.—Shrubs or herbaceous plants. Flowers arranged in terminal or axillary racemes.— *W. and A. Prod.*

This genus though, so abounding in species that, I believe, not fewer than 300 are to be found in European Herbaria, demands but a brief notice here. It includes probably upwards of 30 Indian species nearly all of which except *P. arillata* are annuals or small herbaceous perennials without either beauty or properties to recommend them to notice—several are found on the hills, some procumbent and so hid among the grass that Botanic eyes are required to detect them, two or three others are annual, appearing during the rains among the long grass and about the borders of corn fields. The flowers of all these are small, varying in colour, yellow, pale pink or approaching to lilac.

Polygala arillata (Ham.:) shrubby. branches pubescent : leaves oblong, acuminated, on longish petioles, puberulous beneath : racemes lax, many-flowered, terminal or opposite to the leaves and about as long, drooping : bracteoles caducous : alæ obovate, obtuse, tapering downwards, glabrous : carina cristate : capsule reniform, retuse, coriaceous : seeds globose, smaller than the large caruncnlus.—*W. and A. Prod. p.* 39.

A handsome ramous leafy shrub. varying from 6 to 12 and even in favourable situations, 20 feet high, found growing in shady woods usually near water. Flowers yellow racemose, racemes erect or scarcely drooping ; seeds enclosed in a large scarlet carunculus, leaves deep green from 4 to 6 inches long, and about 2 broad, acuminated, strongly nerved, glabrous or slightly puberulous beneath.

X.—CARYOPHYLLACEÆ.—Chickweed Tribe.

To this family belong, alike the beautiful and much admired Pinks, Carnations, Piccotees, Sweet-williams, Catch-flies and Corn-cockles and the almost inconspicuous flowered Starworts and Chick-weeds. In the former division there are no indigenous species found on the hills, and only three or four of the latter. The one here represented, which is a true native, is introduced rather to show the contrast, as compared with the gay pinks, the aristocratic members of this Natural family, than for any beauty of its own. Such being the case, it is unnecessary to dwell long on this order. Of the first division (*Sileneæ*) several are cultivated in our gardens such as *Dianthus* including carnation, sweet-william, &c., *Silene* or catch-fly and *Argostemma*, or corn-cockle : of the second (*Alsineæ*) several are sufficiently abundant as weeds, among which may be mentioned the *Cerastium* or chick weed and *Stellaria* or starwort, the *Arenaria* or sandwort, here figured, rarely met with about gardens but is abundant on the road side leading to Dodabet, and other equally retired situations.

The bulk of the family is extra-tropical, it therefore seems rather curious that the Neilgherries should have only one representative that they can undisputedly claim as their own. All the others being European plants and probably introduced.

ARENARIA.—*Sandwort.*

Sepals 5. Petals 5, entire. Stamens 10 (or fewer by abortion). Styles 2, 3 or 4. Capsule opening by 3, usually bipartite, valves. Seeds numerous, roundish. small. Stipules none.

The plants of this genus are generally mere weeds, usually growing in sandy soil, very diffuse, spreading extensively, or if growing among bushes climbing among their branches to a considerable height such is the habit of our plant.

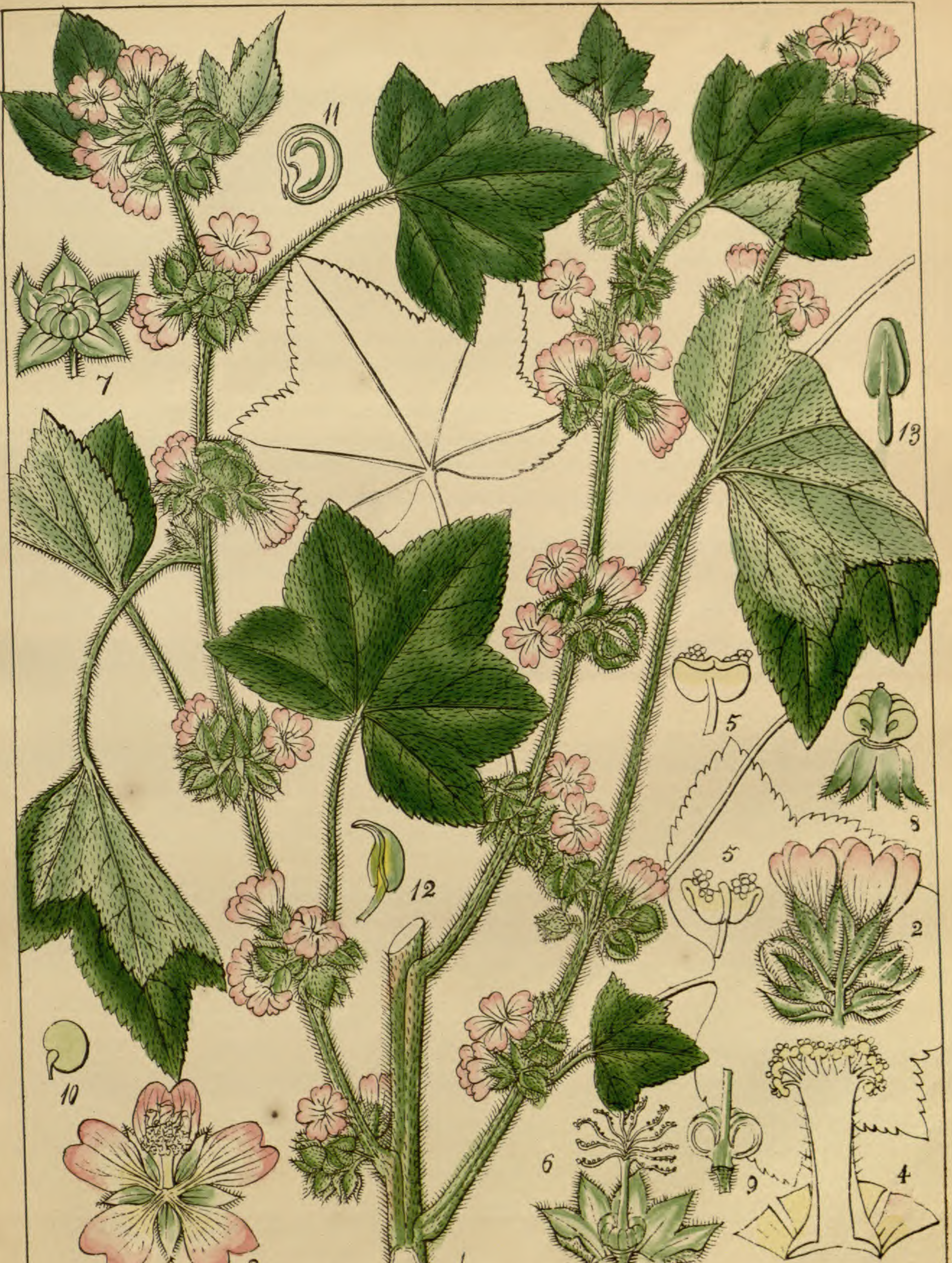
Arenaria Neilgherrensis (W & A.:) stems elongated, much branched, procumbent, with an alternate line of hairs on one side : leaves distant, obovate, mucronulate, glabrous, with minute whitish points, 1-nerved ; margins thickened, nerve-like, ciliated towards the petiole : flowers axillary, or in terminal sub-dichotomous panicles : pedicels viscidly pubescent all round, longish, slender : sepals oblong, acute, with 1 dorsal hairy nerve ; margin membranaceous : petals longer than the calyx : styles usually 3 (sometimes 2 or 4) : capsules ovate, nearly the length of the calyx.—*W. and A. Prod. p.* 43.

XI.—MALVACEÆ.—Mallow Tribe.

This is a large, and in its relations to man, a most important family as supplying him with food and clothing and medicine. Within the tropics, where they abound, several species, are cultivated for the first, such as *Hibiscus esculentus, canabinus* &c. ; cotton, one of the products of this family, is employed as clothing in every part of the globe ; while sundry species of mallow, sida &c., are in request in domestic medicine as emollients, demulcents, and for fomentations in all sorts of ailments, requiring such remedies. Though many of them rejoice in handsome flowers, a few only have found their way into the flower garden, among these may be mentioned the splendid Hollyhock (*Althæa rosea*) the Tree mallows (*Malope trifida* and *malacoides* and *Lavatera abarea*) the Shoeflower and changeable rose Hibiscus. (*Hibiscus Rosa Sinensis* and *mutabilis*). Of these the Hollyhock and Malope, and occasionally a large species of Mallow, perhaps *Malva sylvestris,* find a place in the Hill gardens.

Arenaria neilgherrense (W. & A.)

Dumphy, Lith



Malva neilgherrensis (R.W.)

The species of this order found on the hills are not numerous, and most of those I have observed are also found on the plains. This might be expected as the bulk of them are of tropical origin. It is not improbable, however, when more carefully investigated, that they may prove more numerous than I at present suspect, for I must plead guilty to the negligence of having bestowed less attention on this tribe than I might and ought to have done, in the course of my occasional visits to the hills. Had it been otherwise, it is my belief, I might have found more than two undisputed Neilgherry species with which to illustrate the family. One of these, the Mallow, belongs to an extra-tropical family, the other to a tropical one, having several representations on the plains of India, the best known of which is the Bandy-kai (*Abilmoschus esculentus*) the glutinous fruit and round pea like seed of which is esteemed by many and considered by most people a wholesome vegetable.

The very nearly allied orders *Bombaceæ* and *Lyttneriaceæ* I have not met with on the table land, if it may be so called, of the hills, and have not in consequence introduced them here, but several species are found on both the Eastern and Western slopes, shall as *Bombax, eriodendron,* two species of *Kydia,* a species of *Microchlena* and some others. I may however remark that further consideration leads me to suspect the species of *Kydia* I published under the name of *K. calycina* (Icones No. 879) is distinct from Roxburgh's plant, though identical with the species described in our prodromus under that name, which circumstance misled me while putting the name to the drawing. The smaller flowers and involucral leaves of my plant give rise to this suspicion, which, however, I refrain from acting on until I shall have had an opportunity of comparing specimens of both trees.

MALVA.—*Mallow*

Calyx 5-cleft, persistent, surrounded by an involucel of usually 3, rarely 1-2 or 5-6, more or less oblong or setaceous bracteoles. Ovarium with many cells, each with one ovule. Styles as many as the cells. Carpels several (rarely only 5), capsular, indehiscent, 1-seeded, circularly arranged round the axis. Radicle inferior.— *W. and A. Prod.*

This extensive and very natural genus, including upwards of 100 species, is found scattered over the whole globe, but most abundant in the warmer regions of Europe and about the Cape of good Hope. The species are herbaceous, shrubby or, though rarely, small trees with alternate petioled leaves, usually angled or lobed, occasionally digitately lobed, and axillary flowers. The flowers vary in colour and the colours are so constant that the species have been grouped and distinguished according to that circumstances,a procoeding rare in Botany, owing to the constantly observed tendency of colours of flowers to vary in different plants of the same species, and even in different flowers of the same plant.

MALVA NEILGHERRENSIS (R. W.) annual hairy all over ; branches diffuse somewhat angular : leaves long petioled suborbicular cordate, 5 lobed ; lobes ovate obtuse doubly serrated : flowers numerous,densely aggregated in the axils of the leaves : involucel of three narrow linear lanceolate acute leaflets, shorter than the calyx : calyx somewhat inflated 5 cleft, lobes ovate acute 3 nerved : corolla rose coloured, nearly twice the length of the calyx, petals deeply emarginate, carpels about 10, corrugated on the angles, pubescent.

Kottergherry in cornfields and about villages, in the rich soil surrounding the latter very luxuriant : flowering during the rainy season. The larger leaves are from four to six inches across, pubescent above hairy beneath, supported on a hairy petiol from four to six inches long. Flowers very numerous, small in proportion to the size of the plant, forming dense clusters, or short racemes in the axils of the leaves. Involucral leaves slender clothed with long hairs, acute, calyx considerably inflated,cleft about half way down, hairy, lobes ovate obtuse three nerved and, viewed by transmitted light,finely reticulated between ; after drying translucent and chartaceous: capsule white,triangular,corrugalted along the exterior angles, pubescent. These last points are not shown in the drawing, the figures having been taken from too young specimens.

This species, comes nearest to *M. verticellata* a Chinese plant, but, so far as can be made out from written characters seems amply distinct.

ABELMOSCHUS.—*Bandikai.*

Calyx 5-toothed, spathaceous, deciduous, surrounded by a 5-10-leaved often very caduceous involucel. Ovarium 5-celled; cells with many ovules. Style 1, 5-cleft at the apex. Stigmas 5. Capsule 5-celled, 5-valved, loculicidal, polyspermous. Seeds naked.—*W. and A. Prod.*

The few plants of this genus, known to De Candolle, were included by him in the genus *Hibiscus* but referred, along with many other true species of Hibiscus, to his Section *Abelmoschus.* Subsequent authors have not adopted this arrangement. The genus was originally proposed by M. Medicus in 1787 a treatise on *Malvaceæ :* reduced by D.C. in 1824, and again revived by Dr. Wallich in the letter text of his splendid Plant. Asiaticæ Rariones with reference to a very handsome species figured by him in that work under the name of *Bamia,* (on the plate) a M.s.s. name of Mr. Brown, (in the Banksean Herbarium) whose authority leaves no doubt as to the future stability of the genus.

It now includes upwards of 30 species from India, the Eastern Islands, Cape of Good Hope, New Holland and South America. They are for the most part prickly annuals or biennials, rarely shrubs with alternate bistipulate petioled, entire or palmately lobed, serrated leaves : axillary, solitary, one-flowered peduncles and large, usually, yellow flowers.

The plant here figured was some years ago published by Dr. Zenker in his Indian plants under the name of *Hymenocalyx,* in allusion I suppose to its delicately membranous calyx, which lies concealed within the large rough foliacious involucel, until artificially brought to light, owing to the latter splitting, spath-like, along one side only. This structure is so different from what we find in the other species of *Abelmoschus,* that reconsideration inclines me somewhat to recede from an opinion I formerly expressed in regard to the unsuitableness of separating this as a distinct genus. It certainly sufficiently accords with *Abelmoschus* in most other points, which is adverse to its complete separation, but at the same time, it occurs to me, so great a difference ought to be marked by making it the type of a section or subgenus. Walpers in his Repertorium Botanicum, apparently influenced by similar views, has referred our *Lebritonia procumbens* to *Pavonia* from which it only differs in having a foliaceous 5-leaved involucrem in place of one having from 5 to 15 filiform or subulate leaflets. For these reasons I here correct our former error, by raising this plant to the rank of a subgenus, and making it the type of a section, distinguished by having a spathaceous involucrum enclosing the calyx and tube of the corolla. The involucrum is composed of from 3 to 5 cohering leaves, the flower dissected by the Draftsman seems to have had four, as that is the number shown in the plate. The membranaceous sepals cohere like the leaves of the involucrum and burst irregularly.

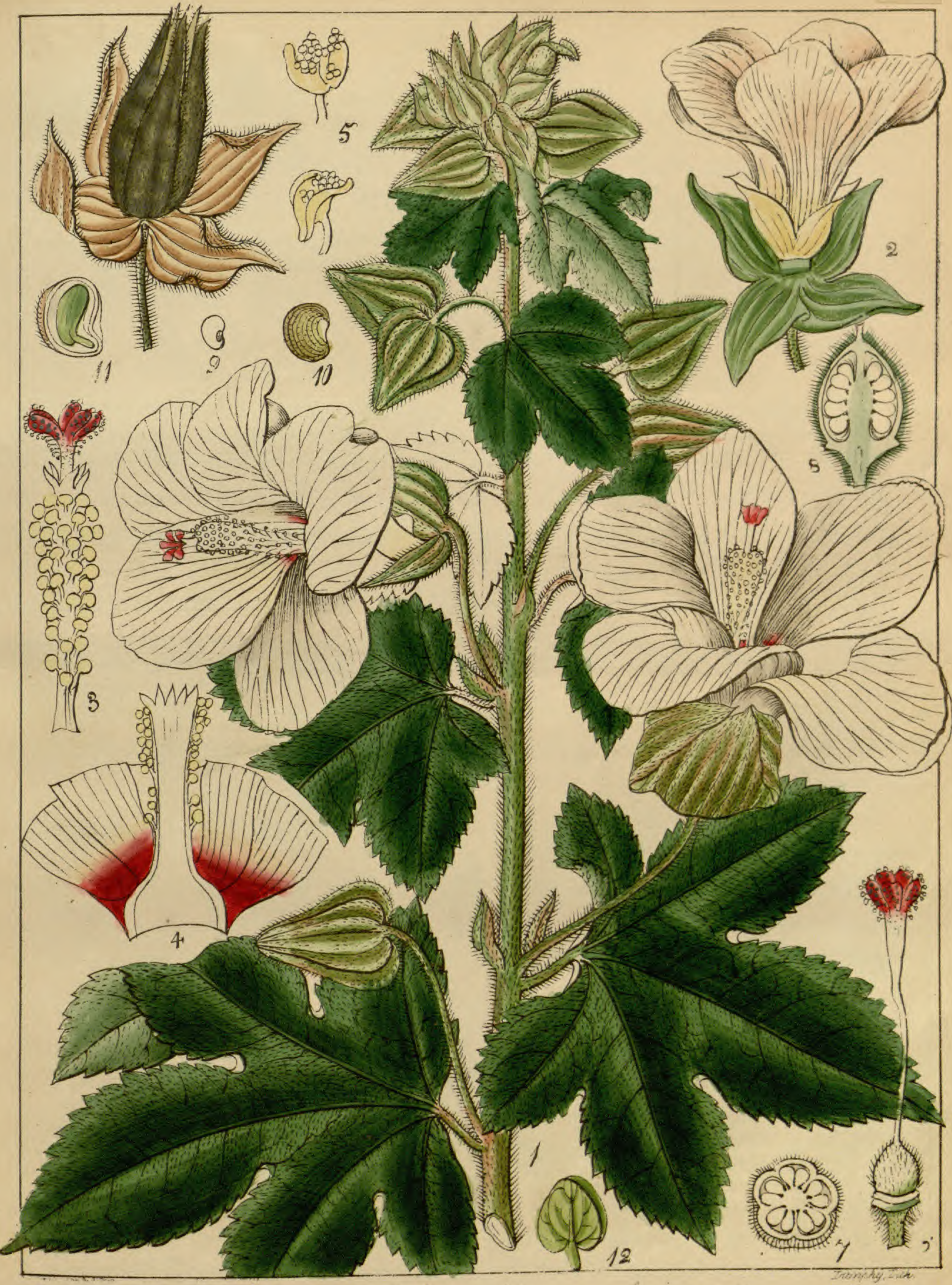
Abelmoschus (Hymenocalyx) angulosus (Wall :) stems herbaceous, not prickly : leaves on long petioles, cordate, 5-lobed, unequally toothed ; lobes ovate acuminated ; upper side pubescent with short softish hairs, under slightly tomentose : pedicels rigidly and horizontally hairy, about as long as the petioles: involucel 3-5 leaved, leaves cohering splitting spath-like : calyx much shorter, and concealed within the involucel, membranaceous : capsule ovoid, acute, very hispid.—*W. and A. Prod. P.* 53.

This is a considerable, erect growing, shrub, frequent in moist soil in clumps of Jungle on the Neilgherries : in favourable situations, as on the banks of streams, attaining the height of from 10 to 15 feet. It is to be met with in flower at all seasons, but perhaps in greatest perfection during the earlier months of the year, contrary to the general character of the genus the flowers are white or very pale yellowish.

I have altered that part of our specific character which refers to the involucel and calyx which, as given in the Prodromus, is incorrect.

XII.—ELÆOCARPEÆ.

Botanists differ in opinion as to the propriety of keeping up this order distinct from *Tilliaceæ* to which, if distinct, it is assuredly very nearly allied, so near indeed, that I feel disposed to adopt Endlicher's views in considering it a suborder of *Tilliaceæ* from which it mainly differs in having fimbriated petals, and in the stamens opening transversely across the apex in place of longitudinally. Distinctions such as these seem scarcely worthy of the dignity of Science, when unaccompanied by strongly marked natural characters. These certainly, are not wanting in the present instance, but seem scarcely sufficient to enable this tribe to be kept up as a distinct family.



Tempsky, Lith.

Abelmoschus angulosus (Wall)

Rungiah, del. Dumphy, Lith.

Monocera Munronii (R.W.)

Considered as a distinct order, it is a small one, consisting for the most part of trees remarkable for the number and unassuming beauty of their flowers. Several species are found on the Hills, namely, one very beautiful species of *Elæocarpus*, perhaps two, though of that I am still uncertain, and three, if not four species of *Monocera*, of which the one here represented is incomparably the most beautiful. I never myself met with it in flower until this season, and was particularly struck with its beauty, which cannot be transferred to paper. I found several trees on the bank below Coonoor in full flower in November. Most of the *Elæocarpi* have very hard tuberculated seed, about the size and somewhat the shape of an olive. These the native devotees are in the habit of boring and stringing as beads, which they constantly wear as a sacred appendage round their necks. The fruit of *E. serratus* is eat on the Hills by the natives, as we eat plums, but is a poor substitute.

MONOCERA.

Calyx 5-sepaled. Petals 5, cuneate, usually silky on the back, 3-5-cleft and much laciniated towards the apex. Stamens numerous (25-80): anther valves unequal; outer one elongated, tapering and subulate, much longer than the inner one. Ovarium surrounded at the base by 5 glands, 2-celled: ovules numerous, in a double row in each cell. Fruit a drupe: nut smoothish or tubercled, 1 2-celled. Seeds solitary in each cell.—Trees. Leaves lanceolate or cuneate-oblong, serrated or entire.—*W. and A. Prod.*

One species only of this genus was known in the Peninsula when our Prodromus was published in 1834 namely *M. tuberculata*, since then I have found that and three others on the Neilgherries, namely *M. ferrugenia*, also described by Dr. Jack as a Malayan tree, *M. glandulifera* Hooker, also found in Ceylon, and the subject of the accompanying figure. The plants composing it were separated from *Elæocarpus* principally on account of their long bristle pointed anthers, those of *Elæocarpus* being broad pointed and rounded at the apex, occasionally, ornamented with a few hairs. The distinction does not seem to be a good one, being much too slight for plants in all other respects so nearly allied. As a section or subgenus it would have been most useful for dividing a large genus, but I do not think it merits the value, as a generic character, which has been assigned. The genus has, however, been preserved by the latest writers, Endlicher and Meisner; I therefore, in deference to their authority, relinquished my original intention of reducing it to the rank of a subgenus and calling the plant here figured *Elæocarpus* (*Monocera*) *Munroii* which would, I think, have been the more appropriate nomenclature.

Monocera Munroii (*R. W. Ill. Ind. Bot.*) glabrous, leaves ovate lanceolate, acuminated slightly serrulate on the margin, without glands on the under surface: racemes about the length of the leaves many flowered, flowers drooping: sepals lanceolate acute: petals not unvolute on the margins: anthers glabrous: apex, at length reflexed, ovary elevated on the torus very hairy: fruit about the size of an olive. —R. W.

On the slopes of the large ravine below Coonoor flowering in November and December, covered with fruit in February, apparently nearly full grown. A. large and handsome tree, which I should estimate at not less than from 60 to 80 feet in height, with a fine umbrageous head, every branch of which, when I gathered the specimen here represented, was covered, like it, with pure white flowers, forming a rich contrast to the deep green foliage. Captain Munro first found it in Coorg and sent me the specimens from which the above character was taken. It is certainly very closely allied to M. *glandulifera*, but differs in technical characters, and as I have never seen that tree in such a state as to admit of their accurate comparison, I am still uncertain whether or not they ought to be united.

XIII.—TERNSTROEMIACEÆ.

This interesting family of beautiful flowering trees and shrubs is principally remarkable on account of its including the far famed Tea and Camellia shrubs: the leaves of

the former being celebrated for their peculiar properties and the flowers of the other for their exceeding beauty, which obtains for them a place in almost every European green house. The two species here figured might, by careful cultivation, be almost made to compete with these in beauty, were it not for their great size, which disqualifies them for house culture, and they are too tender to stand a European winter, however well they might bear the summer temperature of Europe. Two other species, *Chochlospermum gossipium* and *Eurya Wightiana*, of this family are also found on the hills, and the latter so generally diffused, that I have met with it in almost every clump of Jungle from about 5,000 feet of elevation up, to the top of Dodabet. The aspect of this differs somewhat according to the situations it occupies ; when found in woods, where it enjoys both shelter and rich soil, it attains the size of a considerable tree with long lanceolate leaves ; in open ground it has a stunted shrubby appearance with shorter somewhat obvate leaves. These differences lead Arnott and myself to consider them distinct species, which a more intimate acquaintance with all their forms in a growing state does not confirm.

The plants of this family are extensively distributed, being found in Asia, Tropical America, and, more sparingly, in Africa, probably owing to the flora of the last being less known than those of the other two. They seem, however, most abundant in the Phillippine Islands. When the first volume of De Candolle's Prodromus was published in 1824, sixty-two species only were known, since then the number has been increased to about 200, a large proportion of which are from the Phillippine Islands, but many also from Tropical America and Brazil.

The long agitated question as to the origin of green and black Tea has, I believe, been at length settled by the experience of the Assam Tea Company, proving that they are the produce of the same plant differently prepared. A new question has, however, arisen, which threatens for a time to engage the attention of Botanists, namely, whether the Chinese and Assam Tea plants are the same or different species. This is a question which one might suppose could be readily answered, but judging from occasional passing remarks I have seen in scientific periodical publications, it would appear otherwise. This, however, is a point on the discussion of which, I am not prepared to enter, as it would require for its thorough investigation, not merely perfect specimens of both plants but also an aquaintance with them as seen both under cultivation and in the wild state. Judging à priori, and without these data, I should infer they were the same originally, but that, under a long course of cultivation the Chinese one has at length become so altered in appearance that it can no longer be recognised as the same thing, much in the same way as we find the crab become the golden pippin : or, as we find the large leaves of luxuriant mulberries dwindle into small ones under the operation of daily picking.

It is a curious fact, ascertained through the investigations of modern Chemistry, that the peculiar vegetable principle from which Tea, Coffee, Coco and Paraguay Tea derive their nutricious properties is nearly the same in all, and characterized by the large pro-

Rungiah, del. Dunphy, Lith

Cleyera gymnanthera

portion of azote which it contains. In the Chinese and Paraguay tea, it is quite identical and has been called *Theine* from *Thea,* the Botanical name of Tea ; that of Coffee and Coco being slightly different, has been respectively called Coffeine and Theobromine, *Theobroma caco* being the name of the latter. These chemical investigations have further led to the discovery that the fatty deposits of animal bodies contain a large proportion of Azote and that azotized foot is necessary for its production : hence it is justly inferred that these beverages are all endowed with nutritious properties to an extent far beyond what, previous to these discoveries, they were supposed to possess.

Botanically considered, the Tea and Camellia are esteemed species of the same genus In like manner Paraguay Tea and the common Holly are species of the same genus, but chemical analysis has not discovered *Theine* in either Camellia or Holly, a fact that will perhaps lead Botanists to reconsider the Botanical characters of these genera before finally uniting, the former with *Thea* or the latter with *Ilix.*

It is said that a species of *Eurya* is used in Ceylon as tea. There are two specics of *Ilix* on the Hills, one, of these *Ilix dentata* is very nearly allied to the *Ilix Paraguayensis,* it might, therefore, be interesting to have the leaves of both our *Eurya* and *Ilix* analysed to ascertain whether either might be used as a substitute for the Chinese leaf.

CLEYERA.

Calyx of 5 sepals, with 2 bracteoles at the base. Petals 5, distinct, with a broad base, alternate with the sepals : æstivation imbricated. Stamens distinct, adhering to the base of the petals : anthers adnate, linear, dehiscing longitudinally. Style single, crowned by 2-3 stigmas. Fruit baccate, 2 3-celled. Seeds 2 in each cell, pendulous from the summit of the axis, wingless : albumen fleshy : embryo curved.—Evergreen shrubs with axillary peduncles. Flowers of a moderate size, white or yellowish.—*W. and A. Prod. p.* 86.

Only six species of this genus are yet described, of these one is from China, two Japan, one Japan and Nepaul, one from Ceylon, and lastly, the one here figured from the Neilgherries : another is stated by Dr. Wallich to be a native of Nepaul, but that has not yet been described. The Ceylon one, first described in my Illustrations, seems very closely allied to one of the Japan ones, if not indeed the same. The Neilgherry one is a large tree, extensively distributed over the hills.

As ornamental trees, both this and the following merit being more extensively introduced about our grounds and enclosures, and judging from its frequency, in nearly all situations on the Hills, I should suppose this might easily be accomplished and prove a vast improvement, by displacing the *Cassia tomentosa* which is not to be compared with them in beauty. Those who may think of making the attempt thus to decorate their grounds, should raise the plants from seed, as those removed from the jungle generally die, partly owing to the injury their roots sustain in transplanting, but principally through the rude exposure to which their removal from the shelter and rich moist soil of the forest subjects them, when weakened by being deprived of the greater part of the delicate fibres of their roots, which are as truly the organs of nutrition of plants as the stomach is that of animals. When transplanting is attempted, the rainy season, June and July, should be chosen, and the plants selected for removal the smallest that can be found, so as to admit of their being artificially sheltered from the strong winds which then prevail. This is a general principle in transplanting applicable to all sorts of trees and shrubs.

Cleyera gymnanthera (W. & A.:) glabrous : leaves cuneate-obovete, obtuse or shortly and obtusely pointed, coriaceous, entire : peduncles twice as long as the petioles, 2-edged : bracteoles persistent : anthers dotted with little points on the connectivum, without bristles.—*W. and A Prod.p.* 87.

A large tree with bright shining leaves and yellow flowers, flowering in May, June and July, and ripening its fruit in February and March. It is however so generally distributed that it is to be found in flower and fruit at nearly all seasons, varying according to the aspect and shelter it enjoys. The timber is of a red colour, of rather close grain and is by the natives considered strong and durable.

GORDONIA.

Calyx of 5 rounded coriaceous outwardly-silky sepals, with semilar external deciduous bracteoles Petals 5, connected together at the base. Stamens numerous : filaments united at the base with the claws. of the petals (and hence monadelphous or somewhat 5-adelphous, according to the degree of union among the claws of the petals) : anthers ovate, oscillatory. Styles combined to the apex, crowned with a peltate 4-5 lobed stigma. Capsules 4-5-celled, 4-5-valved, loculicidal. Seeds 2-4 in each cell, attached to the central column, terminated by a leafy wing : albumen none: embryo straight radicle, oblong: cotyledons foliaceous, wrinkled and plated lengthwise.—Trees or shrubs, with the appearance of *Camellia* or *Thea*. Peduncles axillary, 1-flowered.—*W. and A. Prod. p.* 87.

Though the number of species of this genus be small, they are widely distributed, Virginia, Carolina, Jamaica, Nepaul, Ceylon, and the Peninsula have each one or more species. They are all trees or large shrubs with handsome camellia like flowers. All the Indian species, that I have seen are trees, and the one here figured often attains a large size.

Gordonia obtusa (Wall.:) leaves cuneate-oblong, obtuse or with a blunt acumination, with shallow serratures, glabrous : peduncles short, not so long as the petioles : petals obcordate, slightly united at the base: stamens somewhat pentadelphous.—*W. and A. Prod.*

A pretty large tree, widely distributed over the Hills, found in Jungles, on every part of them I have yet visited ; flowering during the rainy season, and ripening its fruit during the months of March and April.

XIV.—OLACINEÆ.

This is a small family of trees and shrubs, but extensively distributed, as it species are found more or less abundantly in every tropical country. In regard to its relations to the other dicotyledonous families, considerable difference prevails among Botanists. Mirbel, who first established it as a distinct order, placed it among the polypelalous tribes, in the position it here occupies, near *Aurantiaceæ*. Brown had previously placed *Olax*, the type of the order, as an allied genus at the end of *Santalaceæ*, but differing from true Santalaceous plants in having both a Calyx and Corolla, and a superior or free ovary similar to that shown in both *Gomphandra* and *Stemonurus* while that of *Santalaceæ* is inferior or adherent to the tube of the Calyx as seen in the accompanying figure of *Bursinopetalum*. Nearly all writers subsequent to Mirbel have followed his arrangement. Mr. Bentham in an admirable Memoir published in 1841, in the Linnean Transactions, coincides in the view taken by Mr. Brown, a view which is greatly strengthened by my new genus as well as by Alphonse De Candolle's new genus *Hyphocarpus*, which has a similar structure; for myself, I now feel quite satisfied that the proper station for this order is beside *Santalaceæ* and *Daphnoideæ* in Endlicher's class *Thymalaeæ ;* nor do I apprehend the double floral envelope can offer any solid objection to this arrangement, since the glands inserted on the throat of the calyx of *Santalum, Daphue, Gnidia,* &c., and the calyculus of *Choritrum* may all be adduced as instances of analogous structure, while in the much more important matter of structure of the ovary, ovulum, and seed, the *Olacineæ* closely associate with these orders, and have scarcely any analogy with the orders among which Mirbel and others have placed them. The same remark applies to *Loranthaceæ* which is truly a *Thymalæous* family,

The plants of this order, though interesting in a Botanical point of view, have little to recommend them to the favour of the amateur. *Stemonrus*, when in full flower, is

Rungiah, del. Dumphy, Lith.

Gordonia obtusa

Rungiah del

Gomphandra polymorpha ♂ (R W)

Dunphy Lith.

Gomphandra polymorpha ♀ (R.W.)

Stemonurus? fœtidus (R. W.)

somewhat ornamental at a distance but the fetor exhaled by the flowers does not encourage a closer acquaintance. *Bursinopetalum* is certainly a very fine tree, as seen growing in its native jungles in the humid climate of Sispara, but I am doubtful whether, if transferred to other situations, it would realize the expectations of the planter.

GOMPHANDRA.—*Wall.*

Flowers unisexual, by abortion, calyx small, not enlarging in the fruit. Petals 4 or 5 cohering at the base. Stamens all fertile as many as the petals alternate with them; filaments clavate; anthers innate. Ovary free, 1-celled with 2 ovules pendulous from the apex, stigma sessile, lobed. Fruit drupacious, one-seeded, embryo small in the apex, of a copious albumen, radicle next the hilum.

Large rambling shrubs, inflorescence axillary cymose, flowers numerous in the male, about 3 in the female.

In the rudimentary ovary of the male, traces of two ovules are seen, and the female flowers are furnished with sterile stamens, the anthers of which are hairy, while those of the male are nearly glabrous.

GOMPHANDRA POLYMORPHA. (R. W.) diocious glabrous, leaves petioled, membranaceous, glaucous beneath, from oblong to obavate lanceolate accumi-nated: cymes axillary solitary or in pairs, about the length of the petiol; male, many flowered, female 2 or 3 flowered: calyx entire, minutely 4 or 5 toothed: petals 4 or 5 united below, glabrous: stamens projecting: fruit oblong, crowned with the persistent stigma.

This large shrub is found in the dense clumps of jungle about Coonoor, the Avalanche and elsewhere, flowering in March and April, and, usually, the female, at the same time bearing ripe seed, showing that it is in flower most part of the year. The plant here figured approaches most nearly to my variety *G. angustifolia.* Ill. Ind. Bot. p. 103, but does not seem quite identical. I cannot, however, find characters to distinguish it as a species. It seems rather to be an intermediate form between that variety and *G. coriacia*, differing from the latter in being pentandrous, not tetrandrous, but in other respects, agreeing, upon the whole, better with *coriacia* than *polymorpha.*

STEMONURUS.—*Blume.*

Flowers bisexual or diœcious, by abortion, corolla 5, rarely 6, petaled cohering at the base. Stamens 5, rarely 6, hypogynous; anthers introrse two-celled. Ovary free, one-celled; ovules 2 pendulous. Stigma obtuse. Drupe one seeded: embryo foliacious, immersed in the apex of a fleshy albumen, radicle superior.

Trees or shrubs; leaves alternate entire; flowers axillary small, spicate, cymose, or panicled The genus *Stermonurus* is so imperfectly known that Endlicher has placed it and the preceding, with several others, at the end of the order as "genera 'penitus dubea" and from some differences in the character as given by him, which, however, do not appear essential, it is not improbable our species may yet be separated to form the type of a distinct genus. Agreeing, however, as it does, in so many important particulars, with the character as drawn by the founder of the genus, I donot feel myself at liberty to constitute a new one while uuacquainted with everyother species. The other species of the genus, four in number, are all from Java, while this one seems confined to the Indian peninsula and Ceylon, but is apparently extensively distributed in both, as I have specimens from various stations of both countries. On the Neilgherries it is very abnndant and remarkable on account of the extreme carrion-like fetor of its flowers, which often during bright sunshine indicate its proximity when the tree itself is concealed, by others, from the sight.

STEMONURUS FÆTIDUS (R. W.) leaves elliptic oblong acuminated, venous, pubescent beneath flowers terminal, small: cymose-panicled every where clothed with short hairs: stamens glabrous: style about the length of the ovary: drupe succulent olive-shaped, purple when ripe, nut thin.

Neilgherries in woods, and thickets: flowering during the rainy season, but may generally be met with in both flower and fruit

This, when growing in favourable situations, becomes a large umbrageous tree; the leaves are of a deep green colour, and when young marked with prominent veins to an extent far beyond what the draftsman has here represented. From what cause, I am unable to state, the flowers are often all males, for a long time I had specimens of this tree in my herbarium before I got them in sufficient perfection to enable me to make out its genus; the leaves vary greatly in size, I have seen them upwards of seven inches long and three broad, but the usual size is from 4 to 6 by about 2 broad. The flowers are very numerous small, yellow, clothed with short hairs both outside and in, and during the heat of the day exhaling the most abominable smell of carrion. The fruit is about the size and shape of an olive, pulpy when ripe, and the stone so thin and soft that it can be easily cut with a knife.

BURSINOPETALUM.—*R. W.*

Flowers bisexual superior. Calyx 5-toothed. Petals five, furnished at the apex with an inflexe bidentate process, estivation valvate, Stamens 5, anthers 2-celled introrse. Ovary adherent, one-celled, with a single ovule pendulous from near the apex. Drupe ovoid umbilicate, one-celled, one-seeded, endocarp deeply inflexed so as nearly to divide the cell into two compartments. Embryo small, eccentric, immersed in the apex of ths fleshy albumen ; radical very long superior.

A large umbrageous tree with very dark green, almost purplish foliage : leaves alternate, long petioled, oblong elliptical, acuminated at both ends, from two to three inches long by about one and half broad ; glabrous coriacious. Flowers, terminal cymosely panicled, small in proportion to the tree, calyx conical, pahering to the ovary, limb short, cup-shaped 5-toothed : petals five, ovate pointed, very coriaceous (whence the name, leathery petals) each furnished within at the point with a little bidentate hook. Stamens five alternate with the petals, filaments short compressed, anthers large, cordate ovate, obtuse two-celled introrse attached near the base. Ovary enclosed within the tube of the calyx and adherent, covered by a thick fleshy disk : style short : stigma obtuse. Fruit drupaceous, about the size of a small plumb, ovoid, the apexed by a broad scar where the flower had separated. Putamen hard, deeply inflexed on one side. Embryo small, eccentric, immersed near the apex of a copious fleshy albumen, the radicle, very long, in proportion to the cotyledons, pointing towards the hilum or apex of the seed.

This genus differs from all the rest of the order in its peculiar seed, and from each by many characters. It will form with Alph. DeCandolle's genus, *Hypocarpus*, a new section of the order distinguished by their inferior ovary.

BURSINOPELALUM ARBOREUM (R. W.)
On the slopes of the hills at Sispara in dense forests flowering in April and May, at the same time bearing ripe fruit. In February, when coming into leaf and several weeks before the expansion of the flowers, the foliage is of a lively green colour, afterwards it deepens so much as almost to acquire a purplish tint.

XV.—AURANTIACEÆ.—ORANGE TRIBE.

This is a small but beautiful family of tropical evergreen trees and shrubs, found distributed in some of its forms all over the tropics. The two plants here represented are I believe the only species found on the more elevated portions of the Neilgherries. The Lime is found abundantly in what is called the Orange valley near Kottergherry, the Orange on the slopes at a lower elevation. The fruit of both is brought to Ootacamund and sold in the Bazars and both are considered by the natives quite indigenous. Such being the case I ought probably to have distinguished them as distinct species which, apparently, they are, in place of varieties of the same species. The latter course having, however, been adopted in our Prodromus, I thought it better when putting names to the drawings, to leave the matter as there stated, rather than create discrepancies between the two works, the more so, as each variety is so distinguished that the name may be used either specifically or to indicate a well marked variety. Further consideration has since led me to take a different view, and I now think I should have designated the two plants figured as distinct species, under their respective names, *Citrus vulgaris*, and *C. Limetta* (by mistake *Limonum* on the plate which I request the reader kindly to correct). With regard to the first, I still feel some doubt as to its being the true *C. vulgaris*, as the fruit and large leaves partake more of the character of a citron than an orange ; but, on the other hand, the leaf stalk

Rungiah, del. Dumphy, lith.

Bursinopetalum arbreum (R.W.)

Citrus (A) vulgaris (Resso)

Rungiah, del. Dumphy, Lith.

Citrus (a) Limonum (Risso)
Limetta

of the citron is not winged, while here it is, which is considered an important character. This, therefore, seems to be an intermediate form, if not, indeed, a distinct species; but the limits between the species of this genus are so imperfectly defined that I could not help hesitating before adding to the difficulties which attend their investigation by adding one to the number, which more extended acquaintance with its forms might afterwards require me to reduce. Towards the base of the Hills several other Aurantiacious plants occur, such as *Limonia, Glychosmis, Murraya* &c. The beautiful and fragrant, but very evanescent flowered, *Murraya paniculata* is even occasionally found at an elevation of nearly 5,000 feet. I am uncertain whether either of these species of citrus would thrive at Ootacamund, but the *C. Limetta* certainly does very well when transferred to the gardens at Kottergherry and forms a most ornamental shrub. The other I have not myself met with in its native place, (the specimens from which the drawing is taken, having been brought in by a native Collector) and cannot speak of its fitness as a garden ornament.

CITRUS.—*Orange Lime &c.*

Flowers usually in a quinary proportion. Calyx urceolate, 3-5-cleft. Petals 5-8. Stamens 20-60: filaments compressed at the base, and there more or less united and polyadelphous: anthers oblong. Ovary many-celled: ovules 4-8 in each cell, one above the other in a double row, pendulous. Style terete. Stigma hemisphærical. Fruit baccate, 7-9-celled: cells with several seeds, filled with a fleshy substance composed of numerous irregular pulpy bags or vesicles, which are mere cellular extensions of the sides of the carpels. —Trees or shrubs with axillary solitary spines. Leaves reduced to one terminal leaflet jointed with the apex of the petiole: petiole often winged.

This genus is so universally cultivated and its species so well known under the various names of Shaddock Pumplemose, Orange, Citron, Lemon and Lime, that any remarks on its habits and peculiarities seem quite unnecessary here.

Citrus vulgaris (*Risso*). Leaves elliptical acute or acuminated, slightly toothed: petiol more or less winged, flowers large white: fruit orange-coloured, roundish or slighly elongated or depressed: rind with concave vesicles of oil pulp, acid or bitter.

Neilgherries on the slopes below Kottergherry and Coonoor in the opinion of the Collector quite wild but possibly raised from seed accidentally dropped by travellers.

As above remarked, I am doubtful whether this is the true *C. vulgaris*, some points of the character is at variance with the figure but none of much importance and without better specimens, for comparison, of the true *C. vulgaris* than I possess, I could not venture to found a distinct species on these differences.

Citrus Limetta (*Risso*) leaves oval or oblong often toothed: petiol more or less winged or margined: flowers small white: fruit pale yellow ovoid or roundish, terminated by a knob: rind with concave vesicles of oil: pulp watery acid or sweetish occasionally slightly bitter. Orange valley, near Kottergherry flowering August and September certainly wild. A low, very ramous erest, thorny, bush covered during the flowering season with a profusion of beautiful fragrant white flowers; a very ornamental shrub, well deserving a place in the shrubbery, when judging from what I saw at Kottirgherry, it grows freely.

XVI.—HYPERICINEÆ.—Tutsan Tribe.

This is as much an extra-tropical family as the oranges are a tropical one. They abound in Europe and north America, and the Indian ones are all alpine. Five only have yet been found on the Indian peninsula, all of which are natives of the Neilgherries: two

are natives of Mysore but I do not recollect of any below that elevation, and these only on hills there. The *Hypericum Mysorense* is perhaps the most common on the hills and is indeed a very showy plant. The one here delineated is so very rare, that I can only refer to one station, namely, on a swampy plain, known by the grandiloquent name of " New England" near the Devil's Gap above Sisparah, there forming a single clump around two or three stunted trees. In Europe, the species of this genus are found inhabiting mountains and valleys, marshes and dry plains, meadows and heaths, in short are to be met with almost every where, and always conspicuous, especially towards the beginning of autumn, by their large yellow flowers, that being the prevailing colour of the tribe.

In its affinities this order is nearly allied to *Guttiferæ* so nearly indeed that many Botanists unite them and several other families into a class designated *Guttiferæ,* retaining for the old family, so called ; that of *Clusiaceæ.* The genus *Xanthochymus* almost unites these two families but is distinct from both, having the flowers of *Hypericineæ* combined with the fruit and seed of *Guttiferæ* or *Clusiaceæ,* that is, the flowers are quinary and stamens fascicled in groups as in *Hypericum,* while the carpels are one-seeded, and the structure of the seed the same as in *Garcinia.* Thus the character of the flower forbids its being associated with *Garcinieæ* while that of the carpel and seed are equally opposed to its union with *Hypericineæ* showing at once, that these two orders are quite distinct, and that it is equally removed from both. For these reasons I should propose that the genus *Xanthochymus* of Roxburgh form the type of a new order to be placed between the other two.

For reasons stated in my Illustrations, vol. I. page 130—31. I still adopt the name *Xanthochymus* in preference to *Stalagmitis,* though opposed by all modern authors, Murray's genus, as defined by him, being a hybrid, without a species to represent it, made up of a series of particulars culled from two quite distinct genera and forming, as a whole, such a combination as never met in any plant that ever grew. His *Stalagmitis gambogioides* the only species being partly *Cambogia Gutta* of Linnæus and partly *Xanthochymus ovalifolius* Roxb. Which of the two is it to be taken as the type of the genus ? the one with 4 leaved calyx 4 petals and 4 lobed stigma; or the one with pentadelphous stamens and 3-seeded berries —they can't both go together—if the former is chosen then it has an older name, being *Cambogia* of Linnæus : if the latter, pentadelphous stamens and three-seeded berries does not sufficiently characterize the genus, which has been long ago well defined by Roxburgh and his name generally adopted. One of these names must assuredly be suppressed and in my opinion the hybrid one, without a species to represent it, is the one to go.

I. HYPERICUM—*St. John's Wort-Tutsan.*

Sepals 5, more or less connected at the base. Petals 5. Stamens usually very numerous. united at the base into 3-5 bundles, rarely somewhat distinct. Styles 3-5, distinct or rarely combined, persistent. Caspule unilocular or with several cells. Membranaceous, 3-5 valved, many-seeded. Seeds roundish ; seed-coat double ; albumen none : embryo with semicylindrical cotyledons.—Herbaceous or shrubby plants. Leaves opposite, or very rarely (in H. *alternifolium,* Vahl, Wall. L. n. 4806) alternate, sessile or nearly so. Flowers either solitary, in threes, cymose, corymbosely panicled, or umbellate, usually yellow.—*W. and A. Prod. p.* 99.

Rungiah, del. Dumphy, lith.

Hypericum Hookerianum (W. & A.)
Norysca (spach)

But few of the species of this genus have been admitted into the flower garden, which is the more remarkable as many of them are naturally very handsome, and might, I should suppose, be improved under proper treatment. The *H. Mysorense*, so common on the hills, certainly does form a very ornamental addition to the flower border, even when little care is taken of it, and under skilful treatment might, I think, be greatly improved ; so would *H. Hookerianum* if it will thrive in the garden, as its flowers are much finer than those of the other, when seen to advantage, which they are not in the accompanying figure.

HYPERICUM HOOKERIANUM (W. & A.:) glabrous, shrubby, diffuse : stem terete ; young branches compressed : leaves opposite, somewhat distant, oblong, obtuse with a mucro, contracted at the base with a kind of very short petiole ; lateral nerves arching, and anastomosing ; pellucid dots round and oblong, black dots none : flowers (large) clustered at the ends of the branches : sepals roundish-obovate, obtuse, entire, without black dots : petals not dotted : stamens very numerous : styles 5, distinct, overtopping the samens, shorter than the ovary : stigmas obtuse : captule 5-celled.—*W. and A. Prod. p.* 99.

Neilgherries in swampy ground, flowering in Feb., and March, a shrub with long slender branches, distichous ovate obtuse leaves, perforated with numerous pellucid points, the branches terminated by clusters of large yellow flowers, which, when they first open are nearly saucer-shaped from the overlapping of the edges of the petals. It is at once distinguished from *H. Mysorense* by the form and direction of the leaves which are distichous in this, and decussate, or crossing and spreading in four directions, in that.

XVII.—GUTTIFERÆ.—MANGOSTEEN TRIBE.

This is a small but very interesting family as being, that from which the Mangosteen (one of the finest fruits in the world) and the Gambage (a substance quite unique in its properties) are obtained. So far as the Indian species are concerned, it is peculiarly tropical in its habits. The *Garcinia* here represented is one of the least so I have yet seen, growing as it does, at an elevation of very nearly, if not fully, 6,000 feet, being found in considerable abundance in the woods about Coonoor.

This family has been divided into four sections, according to characters taken from the fruit, but, to my mind, nothing could be more unnatural than the combination as it now stands in the latest Botanical works. The two first sections are *Clusieæ* and *Monorobeæ ;* the first more nearly associated with *Hypericineae* than true *Guttiferae,* having polyspermous capsules ! as in *Hypericum,* while the latter having quinary flowers and many-seeded berries, approaches *Xanthochymus ;* the third section *Garcinie* combines *Garcinea* with *Xanthochymus* and *Pentadesma,* two nearly allied genera, but yet so perfectly distinct from *Garcinia,* that theymight be united into a section or even order by themselves, as genera resembling, but not true congeners of *Garcinea. Mammea,* an American genus, seems to associate better ; but its leaves have pellucid points as in *Hypericum,* a point of structure not elsewhere found in this family, and therefore demanding further investigation. The fourth section, *Callophylleæ,* is more natural, and associates with true *Guttiferae* in its quaternary flowers and erect ovules. The whole order, however, requires revision ; for, as now constituted, it is undistinguishable from *Hypericineae* and includes several genera very remotely if at all related.

The two genera here figured belong respectively to the two Indian sections *Garcinieae* and *Mesueae* which with *Callophylleae* form together the proper types of the family, as indicated by the quaternary arrangement of their flowers. The only point, so far as I can learn from written characters, in which they agree with American divisions, is in having opposite shining glabrous leaves Reasoning from the same data only, written characters, I

should suppose *Clusieae* might, without much violence to affinities, be transferred as a sub-order to *Hypericineae,* and *Monorobeae* be associated with *Xanthochymus* and *Pentadesma* and perhaps, *Platonia,* to form a new order.

But leaving these discussions which are scarcely relevant to this work, I may proceed to observe that the genus G*arcinea* for the most part consists of trees, or large shrubs, with opposite glabrous highly polished leaves, with few, usually nearly sessile, yellow flowers in their axils, inhabiting forests, in tracts of country enjoying a warm humid climate. Hence they naturally abound in Malabar, Ceylon, Tenasserim, the Eastern Islands &c., but are almost unknown in the Carnatic, except where, under local circumstances, the above peculiarties of climate are met with—about Courtallum, for example, species of G*arcinea, Mesua,* and *Callophyllum* are not unfrequent, and there the *Garcinea Mangostana* or true Mangosteen has been successfully introduced. Two species of the genus Garcinea are known to produce Gamboge ; most of the others yield a yellow juice, but not gamboge as it will not mix with water. The *Mesuae* yield very hard wood, hence the Java species has received the name of *M. ferrea* or Iron wood tree, and the beautiful flowered *Callophyllum Inophyllum* also yields a very strong timber, adapted for ship building. There may be other species turned to useful purposes, but these are the principal.

GARCINIA.—*Mangosteen Tribe.*

Flowers monœcious or diœcious. Sepals 4, persistent, without bracteoles. Petals 4, deciduous. Male.—Stamens numerous, short, inserted on a large fleshy 4-angled or 4-lobed receptacle with or without an imperfect pistillum : anthers 2-celled, bursting longitudinally. Fem.—Stamens 8-30, (always ?) imperfect : filaments distinct, or monadelphous, or 4-adelphous ; the fascicles alternate with the petals, without intermediate fleshy glands : anthers destitute of pollen, and usually glandular. Ovary 4-10-celled : ovules solitary in each cell. Style very short, crowned with a large lobed peltate stigma. Fruit fleshy and juicy, indehiscent-4-10-celled, crowned with the permanent style. Seeds solitary in each cell.—Trees.—*W. and A. Prod. p.* 100.

The species of this genus found in the Peninsula are nearly all, except the one here figured and *G. conicarpa,* found ou the sea coast, or but little elevated above that level. The subject of this notice I first found on Mr. Lascelles' estate at Hulicul, and since then, on the banks of the river at Coonoor ; in both places growing in thick jungles close by the stream, some of its roots in the water—since then I have also found it on the Malabar slopes, but at a somewhat lower elevation.

Garcinia papilla (R. W.) diœcious leaves short petioled, obovate, obtuse: flowers axillary, nearly sessile, aggregated in the stameniferous, solitary or three together in the fructiferous plant: stamens numerous, filaments united, forming a thick short androphore without a sterile style : anthers 2-celled dehiscing longitudinally : ovaryglobose 8-celled : style a thick short fleshy body, crowned with 8 spreading star-like persistent stigmas, enlarging with the fruit : fruit ovate, oblong, furrowed, 8 or, by abortion 4 or 6 celled, crowned with the greatly enlarged style : seed somewhat triangular, covered with a thin coloured membranous testa.

A diffuse tree growing on banks of streams near Coonoor also in similar situations at Sisparah. Flowering during the rainy months. This species in general appearance is allied to both *G. Roxburghii* and *G. Cambogia* (the *G. Kydia* W. and A. Prod. not Roxb.) but differs from both in the style, the form, and the peculiar nipple-like prolongation of the fruit, whence the name. This last structure seems confined to this plant and to Roxburgh's G. *Kydiana*, a very distinct species, where it exists in a less degree.

MESUA.—*Iron-wood tree.*

Sepals 4, persistent, without bracteoles. Petals 4, alternate with the sepals. Stamens very numerous, slightly connected at the base into a fleshy ring : filaments filiform : anthers erect, 2-celled, bursting longitudinally. Ovary ovate, 2 celled : ovules 2 in each cell. Style longish : stigma peltate,

Rungiah del. Dumphy Lith.

Garcinia papilla ♂ (R. W.)

Rungiah del. Dumphy Lith.

Garcinia papilla ♀ (R. W.)

Rungiah, del. Dumphy, Lith.

Mesua speciosa (Chois)

entire. Capsule ovate, acute, 1-celled (by the obliteration of the dissepiment), 2-valved, 1-4-seeded. Cotyledons distinct.—A tree, with a straight slender trunk. Leaves oblong-lanceolate, acuminated, upper side shining, under glaucous : midrib and the margins coloured, lateral nerves close, parallel, almost inconspicuous. Flowers terminal or axillary, large, white. Fruit about the size of a small apple.—*W. & A. Prod. p.* 104.

This genus is purely Asiatic, and is limited, so far as yet known, to 5 or 6 species : figures of three of which I formerly published. They are all handsome trees with large pure white flowers. The one here-figured affords a good idea of what they are, when in full flower. They are handsome growing trees with ascending rather than spreading branches; the leaves of all quite entire, lancet-shaped, perfectly glabrous and, for the most, covered beneath with a thick coating of white bloom. In the parts of the flower they agree with, *Garcinia*, having 4 sepals and four petals, but differ in the ovary, which is 2-celled with two erect ovules in each, in place of 4 or more celled with 1 ovule in each.

Callophylleæ forms a further descent in that organ, having a one-celled ovary with from one to four ovules, but agrees in the quaternary flowers, 4 and its multiples being constant. Notwithstanding these differences in the ovary, both these tribes seem correctly referred, as sub-orders, to *Guttiferæ*, but taking habit into consideration they cannot be viewed as actual associates, and could not be included in one diagram, in the manner adopted by Dr. Lindlay in his School Botany,* along with true *Garcineæ*.

MESUA SPECIOSA (CHISY) leaves long linear-lanceolate subacute : flowers shortly peduncled : petals exunguiculate roundish, regular, mature fruit, four-seeded. *Choisy, in D. C. prod.*

This very handsome tree I found on the Eastern slopes of the Neilgherries, 3 miles below Coonoor, probably at an elevation of about 5,000 feet above the sea.

It is not easy to distinguish the species of this genus. I formerly published a figure of the Ceylon plant under the name of *M. ferrea* and up to the present time thought this distinct. A closer examination however leads me to doubt whether the continental one is different from the insular tree, the more so as the original *M. ferrea* is an Eastern tree, while the *M. speciosa* is from Western India. The distinctions between the two as given by Choisy are that in *M. ferrea*, the petals have a claw or 'unguis' which is wanting in this, and that the fruit in that is one-seeded, while in this four is the usual number.

XVIII.—HIPPOCARTIACEÆ,

This, like the former, is for the most part a tropical family, or inhabiting the warmer countries immediately bordering the tropics. The species seem pretty equally divided between South America and Asia predominating, however, in the former. The additions which have been made to the order since its publication in De Candolles' Prodromus, have been principally Asiatic, which have materially tended to equalize the numbers for the two countries. At that time, 1824, the American ones exceeded the Asiatic and African species by more than a half, now they are nearly equal. It is not to be supposed that a family so tropical in its habits should abound on the Neilgherries, and such experience proves, as the one figured is almost the only species I have found at a considerable elevation. This shrub I found at Sisparah at an elevation of, I think, about 5,000 feet, at a lower elevation two or three others are found, but these come within the tropical range.

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* This I consider one of the most ingenious and, so far as it goes, most useful works now extant on Botany. And no one desirous of becoming thoroughly acquainted with the true working of the natural system should fail to study that Book which may almost be said to present the geometry of Botany, its diagrams being, to the Botanist, of much the same value as those of Euclid are to the Mathematician. The introduction of Diagrams to represent the essential characters of orders I look upon as the first step taken toward reducing Botany to the precision of an exact science, and establishing, on a firm and satisfactory basis, the principles of natural classification ; and, therefore, view the publication of this little book as the commencement of a new era in this science. It has only one fault, which doubtless will be remedied in the next edition, namely, there is two little of it, the diagrams being confined to the elucidation of European families, and of these a selection only has been introduced. Now that he has shown the way, it is to be hoped the next edition of the anthor's Natural System of Botany will be similarly illustrated throughout, and that, ere long, we shall have a genera plantarum in which the limits of both orders and genera are so defined, the mode of doing so being so simple that it might be executed at little cost.

P. S. While this sheet was passing through the Press, I heard from Dr. Lindley himself that an Illustrated edition of his Natural System is in course of publication, and an enlarged edition of his School Botany is already published.

The principal peculiarity of this order lies in the stamens, the filaments of which are much dilated at the base and adhere by their margings, forming a cup, which incloses the ovary. This peculiarity has led to their being placed at a considerable distance from *Celastrineæ*, though in reality very nearly related. The two Indian genera are separated by three well marked points of structure. In H*ippocratea* the anthers open across the apex, the fruit is capsular, and the seed are winged. In *Salacia* the anthers open longitudinally, the fruit are baccate, and the seed wingless. They also differ in habit, in the former the flowers are panicled, in the latter, fascicled in the axils of the leaves.

Of the genus *Salacia* De Candolle described 12 species in 1824 ; between that date and 1842, 19 were added to the list, and the one here figured makes twenty, being equal to an increase of 160 per cent in twenty years. The number of new species throughout the vegetable kingdom generally, discovered in that time, certainly does not equal that average, though I believe it may with perfect safety be estimated at from 70 to 80 per cent. A most extraordinary fact, as affording a conclusive example of the very engrossing influence this most fascinating science is capable of exerting over the human mind, to have called forth such an astonishing amount of mere animal exertion, exclusive of the dangers surmounted and privations endured by its votaries, in the prosecution of their favourite pursuit. Linnæus in 1760 knew about 8,000 species, and estimated that 10,000 would comprise the flora of the world, 68 years after in 1828, Sprengel defined, in his species plantarum, 60,000, and now in 1845, descriptions of not fewer than 100,000 are scattered through our Botanical literature, and probably fully 20,000, still undescribed species, already exist in the Herbaria of Europe. At this rate, I believe, we may at a moderate computation, estimate the flora of the world at over 200,000 species.

SALACIA.

Calyx 5-cleft. Petals 5, inserted between the torus and the calyx. Stamens 3, inserted on the top of the torus or between the torus and ovary : filaments flat, distinct : anthers adnate 2-celled ; lobes divaricating at the base, dehiscing longitudinally. Ovary 3-celled : ovules 2 or more in each cell. Style short. stigma obsoletely 3-lobed. Fruit indehiscent, fleshy, often 1-celled from abortion. Seeds solitary in each cell, wingless, covered with pulp.—Shrubs or small trees. Flowers in axillary corymbs, or more frequently, from the abortion of the common peduncle, on simple 1-flowered pedicels arising from a small axillary tubercle ; rarely (ever ?) in axillary dichotomous panicles.—*W. and A. Prod. p.* 104.

The species of this genus are for the most part rambling shrubs with numerous small aggregated axillary flowers and several with large fruit. The seed of this species and of our *S. oblonga* are large, fleshy masses without any appearance of cotyledons or radicle, so that their true structure, whatever that may be, will require to be made out by causing the seed to vegetate, a method which I neglected to adopt at the time of obtaining the specimens and am now unable to state what it is.

Salacia macrosperma (R. W.) a diffuse, rambling shrub; leaves oblong, elliptic, acuminated, corracious, glabrous: flowers numerous, fasicled, short pedicelled : calyx 5-lobed fringed with rusty coloured hairs : petals ovate, obtuse, broad at the base : ovary 3-celled with 2-superposed ovules in each : fruit irregularly ovate, few seeded : seed ovoid conferuminate without a conspicuous radicle.

Jungles about Sisparah flowering, and at the same bearing full, grown fruit in April.

This species seems nearly allied to my *S. verrucosa* but wants the warty stems, and has a ciliated, in place of glabrous, calyx. The plants, besides, when compared, seem quite distinct, though the differences are not easily stated in words. The structure of the anthers and ovary amply distinguish it from my *S. multiflora* ; in this the anthers open longitudinally, in that transversely : here the ovules are two superposed in each cell, there they are numerous, forming two rows.

Rungiah, del. Dunphy, Lith.

Salacia macrosperma

XIX.—SAPINDACEÆ.

This is a large order, exceedingly tropical in its habits, and interesting in an economical point of view from several of its species affording edible fruit, and others the well known detergent known under the name of soap-nut. The Lichi and Ramboatan are examples of the former, the fruit of several species of *Sapindus* supply the latter. It is not, however, my intention to dwell on this order, as, with one or two exceptions, all the species belonging to it are found on the plains or lower slopes; and being, therefore, purely tropical plants, scarcely come within the scope of these remarks on alpine vegetation. One species of the family, *Dodonoea viscosa,* certainly does ascend to the higher levels; but being much more abundant on the plains, and having no other peculiarity beyond its power of adaptation to different climates to reecommend it to our consideration, need not be further noticed here. It may however be remarked, in passing, that it differs from most of the other plants of the family, in having simple, not compound leaves, the predominant form in this order, and in having no corolla. The want of a corolla is probably of less note than the other, as the flowers generally are unsymmetrical, parts being wanting or irregularly formed. The ovary is pretty constantly 3-celled, which, combined with the irregularity of the flowers, forms the principle distinguishing character of this family. This, however, is not constant, as in the genus S*chmidelia* two cells is the usual number. The following character and figure of that genus will serve to illustrate these peculiarities of the order.

SCHMIDELIA.—*Inss.*

Sepals 4, unequal. Petals 4, the fifth or superior one deficient, and its seat vacant, either naked on the inside or usually furnished with a scale above the unguis. Disk incomplete, with 4 glands opposite the petals. Stamens 8, inserted on the receptacle, and connate round the ovary at its base. Ovary usually 2-, sometimes 3-lobed: style from between the lobes of the ovary, 2-3-cleft, the segments recurved, longitudinally stigmatose on the inside. Fruit indehiscent, 1-2, or rarely 3-lobed: lobes somewhat globose, fleshy or dry, 1-celled. Seeds with or without an arillus.—Trees or shrubs, usually with trifoliate, rarely with simple, exstipulate leaves. Flowers white, small, in axillary racemes.—*W. and A. Prod. P.* 109.

The species of this genus are generally somewhat rambling shrubs, and when growing in thickets' climbing among the trees and bushes often to a considerable height. When growing in open ground, they are low bushy shrubs. They resemble each other so closely that their discrimination is generally most difficult. The one here represented affords a striking example of this fact; a passing good figure of it was published by Rheede in the Hortus Malabaricus about 150 years ago, and yet, from that time until now, his plant has never been recognized, while the figure itself has been quoted by almost every writer on Indian plants for one or other of the recognized, species. In our Prodromus it is quoted as a synonym for *S. Cobbe* with the addition "not good" which is most true, but for the plant here figured it is good. I have therefore dedicated the species to the memory of the original discoverer, feeling quite certain, at the same time, that it is his plant, partly from its likeness to his figure, and partly from having found it in Malabar as well as on the hills.

SCHMIDELIA RHEEDEI (R. W.) a diffuse shrub, all the young parts densely villous or tomentose : leaves elliptic, oblong, acute or acuminated, serrated, pubescent above; at first shortly tomentose, afterwards villous beneath : racemes axillary, solitary or sometimes paired, often longer than the leaves, branched ; rachis hairy : calyx glabrous 4 sepaled, sepals unequal, lateral pair orbicular : petals 4 spathulate hairy with 4 fleshy glands at the base : ovary hairy, minute, style compressed ending in two spreading stigmas, berry two, or, by abortion, one lobed ; lobes obovate obtuse, glabrous : cotyledons, fleshy, foliaceous folded,

Growing in thickets in Malabar and on the Neilgherry hills. The ripe fruit I have not yet found, but presume that it is alike the rest, a red, succulent bacca. This is distinguished from all the other species I have seen by the ramuli and under surface of the leaves being tomentose and by the many branched racemes.

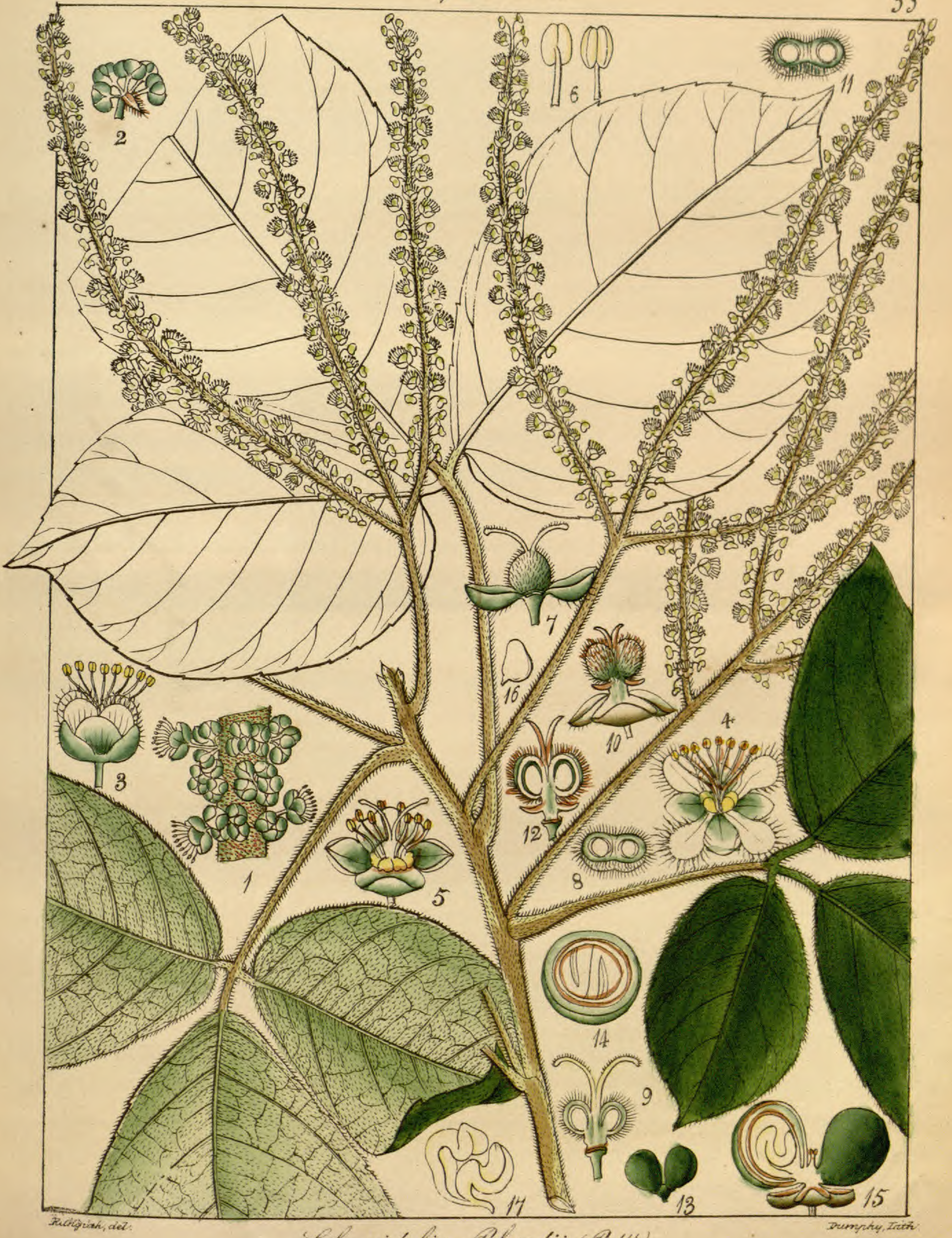
XX.—MILLINGTONIACEÆ.

This small order, consisting of a single genus and five or six species, was first established by Mr. Arnott and myself in our Prodromus of the Peninsular Flora. The species are all large trees ; and though there are but five known, they are widely distributed over India ; 3 are found in Ceylon, and, proceeding northward, extend as far as Nepaul and Simla, and eastwards, to Silhet, Mergui, and Java, how much further I have yet to learn. Of the five known species, two certainly are found on the hills in great abundance, and probably another, though I have not yet observed it, which I found on the hills in the Madura district. Both the Neilgherry ones grow at great elevations abounding about Ootacamund, and more rarely descending so low as Coonoor or Kottergherry.

The natural affinities of this family associate it in many points with *Sapindace*, from which indeed it seems scarcely distinct, as shown by the circumstance of *M. Arnottiana*, which was described from fruit only, being by us referred to that order under the name *Sapindus microcarpus*, in allusion to its small fruit as compared with other *Sapindi*; but, at the same time, I doubt whether, in tracing its affinities, sufficient attention has been bestowed on the examination of its relationship to *Anacardiaceae* with which it most strikingly agrees in habit as well as in various points of structure. Both the hill species are large handsome trees, and, when in flower, very conspicuous, owing to the large panicles of their minute white flowers strongly contrasting with the deep green of their foliage.

One curious circumstance may be noted in regard to this small genus, the occurrence, namely, in it of simple and compound leaves. In families having both forms the simple leaved species usually have a jointed footstalks, indicating that it is simple by the abortion of some of its parts ; in the simple leaved Millingtonias, no such joint exists ; hence they are truly, not apparently, simple.

As there is but one genus in the order, the ordinal character is substituted for a generic one, there being no other with which to compare it to establish distinctions between them. The following, therefore, is the character of the order as well as of the genus.



Rungiah, del. Dunphy, lith.

Schmidelia Rheedii (R.W.)
Molago marum (Rheede)

Rungiah del. Dumphy, lith.

Millingtonia pungens (Wall)

MILLINGTONIACEÆ.—*Roxb.*

Sepals 5, persistent, unequal, somewhat in a double series: æstivation imbricative. Petals 5, inserted on the margin of the receptacle, deciduous, alternating with the sepals, of two kinds; three outer ones orbicular, entire, with an imbricative æstivation; two interior smaller, acutely bifid, resembling scales. Stamens 5, opposite to the petals, and slightly united to them at the very base: three exterior sterile, opposite to the larger petals; two interior fertile, opposite to the bifid petals: filaments of the fertile stamens flat: anther-cells globose, dehiscing transversely, placed side by side on the inner side of the saucer-shaped connectivum. Disk flat, thin, hypogynous, free except at its point of attachment with the ovary and receptacle. Ovary ovate, 2-celled; ovules 2 in each cell, superposed. Style simple, short, and thick. Stigma slightly 2-lobed. Fruit a 1-celled, 1-seeded drupe; the dissepiment evanescent above, hardened and persistent at the base. Seed with a small cavity on the side, near the base. Albumen none, or extremely thin. Embryo curved: cotyledons thin, foliaceous, folded: radicle curved, pointing to the hilum.—Trees. Leaves alternate, without stipules, entire or pinnated. Inflorescence in panicles, terminal, or axillary near the extremity of the branches. Flowers small, inconspicuous, nearly sessile on very short peduncles that are arranged along the horizontal branches of the panicles.—*W. and A. Prod. p.* 115.

Millingtonia pungens (Wall.) leaves simple, coriaceous, lanceolate, acute at the base, quite entire, glabrous on both sides, nerves beneath with a rusty pubescence: panicle rigid, densely covered with a rusty pubescence; rachis terete; flowers on the ultimate branchlets of the panicle aggregated: calyx with 3 bracteoles; sepals unequal, glandularly ciliated; outer petals roundish, concave; inner ones cleft beyond the middle, equal to the filaments.—*W. and A. Prod p* 115.

A large tree very abundant in the woods about Ootacamund—flowering during the warm season—Panicles large, terminal, flowers white, leaves thick and leathery; the branches of the panicle and the calyx clothed with short, matted rusty coloured hair. Fruit about the size of a pea, dark brown, nearly black, when ripe.

XXI.—AMPELIDEÆ.—Grape vine tribe.

In an economical point of view this is an interesting order as being that which yields the grape vine; but this, the *Vitis vinifera,* is the only species belonging to the family of any real value to man. The Fox-grapes of America are used there for some purposes but can hardly be considered an exception to the rule, and still less can an Indian species from which, in Mysore, vinegar is sparingly prepared. In a Botanical point of view the family possesses considerable interest on account of the differences existing among Botanists both as regards its affinities, with other orders, and the difficulty which has been experienced in finding generic characters under which to arrange its numerous species.

It is not my intention here to dilate on either of these points, I shall therefore content myself by observing that its true affinities, as shown by uniformity of habit and structure of the flowers and seed, are unquestionably with *Araliaceæ,* and through them to *Umbelleferæ,* but, differing from both in the free, not adherent, ovary. The climbing habit, and especially, the mode of union of the leaves to the stem, combined with the valuate estivation of the petals and albumenous seed, all point to this relationship which is only opposed by the solitary difference of the superior ovary, or, in other words, the calyx being less developed and not adhering to the ovary. Influenced by these views, Endlesher has, in his genera plantarum, placed this order next *Araliaceae* as suggested by Lindley; DeCandole also points

out this relationship, but being trammelled by the necessity of adhering to the artificial portion of his system, which groups families according to the more obvious structure of their flowers, had to place it among those with inferior or hypogynous flowers, though he saw that the true affinities connected it with perigenous orders.

The generic characters employed to divide this family are very unsatisfactory; and, as remarked by Mr. Brown, are hardly sufficient to supply sectional divisions. *Cissus* is separated from *Ampelopsis*, by having quaternary flowers, while *Ampelopsis* has quinary, those two genera being in all other respects the same. *Vitis* again, which also has quinary flowers, is distinguished from *Ampelopsis*, partly by the habit of the plants, namely, the compound coriacious leaves of the latter, and partly by the dehiscence of the flowers. In *Cissus* and *Ampelopsis* they expand from the apex as in most other plants while in *Vitis* the petals adhere so firmly at the apex that they generally separate from the base and fall off as one, like an extinguisher, so that a *Vitis* whose flowers by any chance open from above, becomes an *Ampelopsis* and an *Ampelopsis* by an opposite chance, becomes a *Vitis*. On these grounds, Dr. Wallich in his catalogue referred the whole there named to one genus, *Vitis*, a course in which we followed him in our Prodromus; and for the same reasons, I refer the accompanying figure to the genus *Vitis*, adding the as a sectional name *Ampelopsis*, on account of its quinary flowers dehiscing from the apex. Two other peninsular species are referrible to the same section, namely, *Vitis tomentosa* and *Vitis indica* of our prodromus.

VITIS.

Calyx nearly entire. Petals 4-5, distinct and patent, or united at the apex, but distinct at the base, and falling off like a calyptra. Torus elevated in the centre, and surrounding the lower part of the ovary, with which it is incorporated, girt at the base by a short ring (expansion of the torus) upon which the stamens are inserted. Ovary partly enclosed within the torus, 2-(or occasionally 3-) celled. Ovules 2 in each cell. Berry 1-2- (or occasionally 3-) celled, 1-4-seeded.—Peduncles usually changed, occasionally in whole or in part, into tendrils.—*W. and A. Prod. p.* 124.

All the species of this genus are rambling shrubs growing among trees and bushes, and, aided by tendrils, generally ascend to the top of their supports before they begin properlyto flower. The Tendrils in this family consist of altered flower stalks, hence in the young plant they abound; when it has attained maturity they develop and become clusters of flowers. In Cissus and some species of Ampelopsis they are either all tendril or wholly floriferous; in the true vine they are partly both, that is, each cluster has a tendril, which is not the case in *Cissus* or the accompanying *Ampelopsis*, though both the others abovenamed have cirriferous peduncles.

Vitis (Ampelopsis) Neilgherriensis (R. W.) leaves coriacious, palmately trifoliolate, slightly mucronately dentate, middle one, broad oval acuminated, lateral ones unequal sided, like the centre one ending in a slender straight acumen: cymes terminal peduncles, longer than the leaves: flowers pentandrous, petals distinct.

This species I found at Kottergherry and Neddawuttum, but at neither place have been so fortunate as to find it in fruit. The under surface of the leaves are sometimes coloured of a deep crimson: those from which the drawing was made were paler beneath.

Dr. Royle has described a nearly allied species from the Himalayas, but which differs in the form of the leaflets, as well as their being deeply serrated, and in having small, short peduncled, cymes. The venation of the leaves also differs considerably and shows at once they are distinct species. These distinctions are drawn from comparison of specimens.

Rungiah; del. Dumphy, Lith

Vitis (ampelopsis) Neilgherriensis (R.W)

XXII.—BALSAMINEÆ.—Balsam tribe.

Most of the families we have hitherto considered have shown a marked tropical or extra-tropical tendency, the one we are now about to consider may be viewed as possessing a transition character, being found in both the temperate and tropic zones. But though much more abundant in the latter than the former, its species are only found in perfection during the rainy and cool seasons, and it is in the more elevated and cooler regions they most abound. In illustration of this statement, I may mention that upwards of 20 species are found on the Neilgherries, of which only two or three are found to descend to the plains, and these only towards the western slopes, where their growth is promoted by the humidity of the climate. On the Pulney range, in like manner, where, during the autumnal months, a cool and humid climate prevails, I found ten or twelve species. On the more elevated portions of Ceylon they also abound during the rainy season. Thence they extend northward far as the Himalayas, always selecting the rainy and cool seasons as those during which they attain their greatest perfection. To the few met with in Europe the same observation holds true. Hence, though India may be looked upon as the head quarters of the family, they may still be considered a transition order as they are but sparingly found in the warmer regions, and then only during the coolest seasons.

Much has been written on the structure of the flower of these curious plants, and very different views taken of the nature of the parts of which they are composed until professor Kunth published his explanation which, for a time, was generally adopted ; he sets out with the assumption that they are throughout quinary in the number of their parts, on the ground that they have 5 stamens and 5-celled ovaries. On this point there can scarcely be two opinions. The question then comes to be, how are we to discover 5 sepals and 5 petals among the six apparent parts of which the flower is made up. It is done thus, take, for example, *Impatiens fruticosa*. The upper two-lobed petal-like piece he considers 2 sepals soldered together : the lower spurred piece he also considers a sepal, and then there are the two lateral sepals, making in all 5—viz. 2 upper, 2 lateral, and 1 inferior. Within these are two lateral, 2 lobed petals: each of these he considers two soldered together, making four petals : the 5th, which should stand between the two upper sepals, he supposes wanting, or so united with them that it does not appear if present.

This explanation of the structure of the parts of a Balsam flower, though generally adopted at first, did not long remain undisputed. Professor Roeper took a very different view of the parts of the flower, and of course gave a different explanation of its structure, but one not so easily explained, except to persons conversant with descriptions of Botanical structure. He equally considers the flower a quinary one, but in place of considering the upper two-lobed part, two united sepals, he thinks it the odd petal. The spur, he considers, the odd sepal, then the lateral sepals as one pair, and two scales often absent ; but when present, situated at the base of the odd petal, as the other pair : then the 2-lobed lateral petals, he, like Kunth, considers, each, two united, making four, which, added to the above, completes the number. The rarity of the scale-like sepals and their minuteness, when present, seems

adverse to this view : further, he requires that the spur, which is invariably pendulous, and the part of the flower most remote from the axis or stalk that bears it, that is when placed horizontally, should be considered, not normally so, but by a twist of the pedicel, and that its true position is posterior or next the axis. He, therefore, like Kunth, views the spur as the odd sepal, but thinks its proper position should be posterior next the axis, while Kunth considers it anterior or remote from the axis. Analogy and the position of the bracts are in favour of Roeper's view, the odd sepal of both *Tropeoleae* and *Geraniaceæ*, two very nearly related orders, being posterior and often spurred. Should the odd sepal of *Balsamineæ* prove anterior, then it will stand, in that respect, in the same relation to these other orders, as *Leguminosæ* does to *Rosaceæ*, if posterior, they may all be united into a class. Should Roeper's view prove, as I believe it will, the correct one, it will go far to unite the four orders, *Balsamineæ*, *Geraniaceæ*, *Tropæleæ* and *Oxalideæ* into one great family, all having the same arrangement of the parts of the flower, all, except the last, having spurred sepals, and in all the spurred or odd sepal posterior. Dr. Lindley, in his school Botany, seems to take an opposite view of *Geraniaceæ*; as, in his diagram, he represents the odd sepal anterior, which is, I find, an error, perhaps of the printer. As such discussions are not easily followed without the assistance of figures, I shall introduce into the next part an undescribed species which I lately found, adding diagrams explanatory of the above descriptions.

Though thus affording an admirable field for the display of Botanical ingenuity, the plants of this family have nothing to recommend them to our attention except their beauty as flowers, and it is certainly surprising to me that they are not more prized by the florist, the common Balsam, *Impatiens Balsamina,* being the only one I have seen in cultivation, a distinction which, when double, it well merits. Many other species, however, are, in their natural state, much finer than the wild Balsam, and would, I believe, become much finer flowers if cultivated with equal care, such I conceive would be the case with either *I. fruticosa*, *I. scapiflora* or *I. fasciculata*, all most common on the hills during the rainy season, the latter ornamenting every swamp and ditch side with its numerous large rose-coloured flowers.

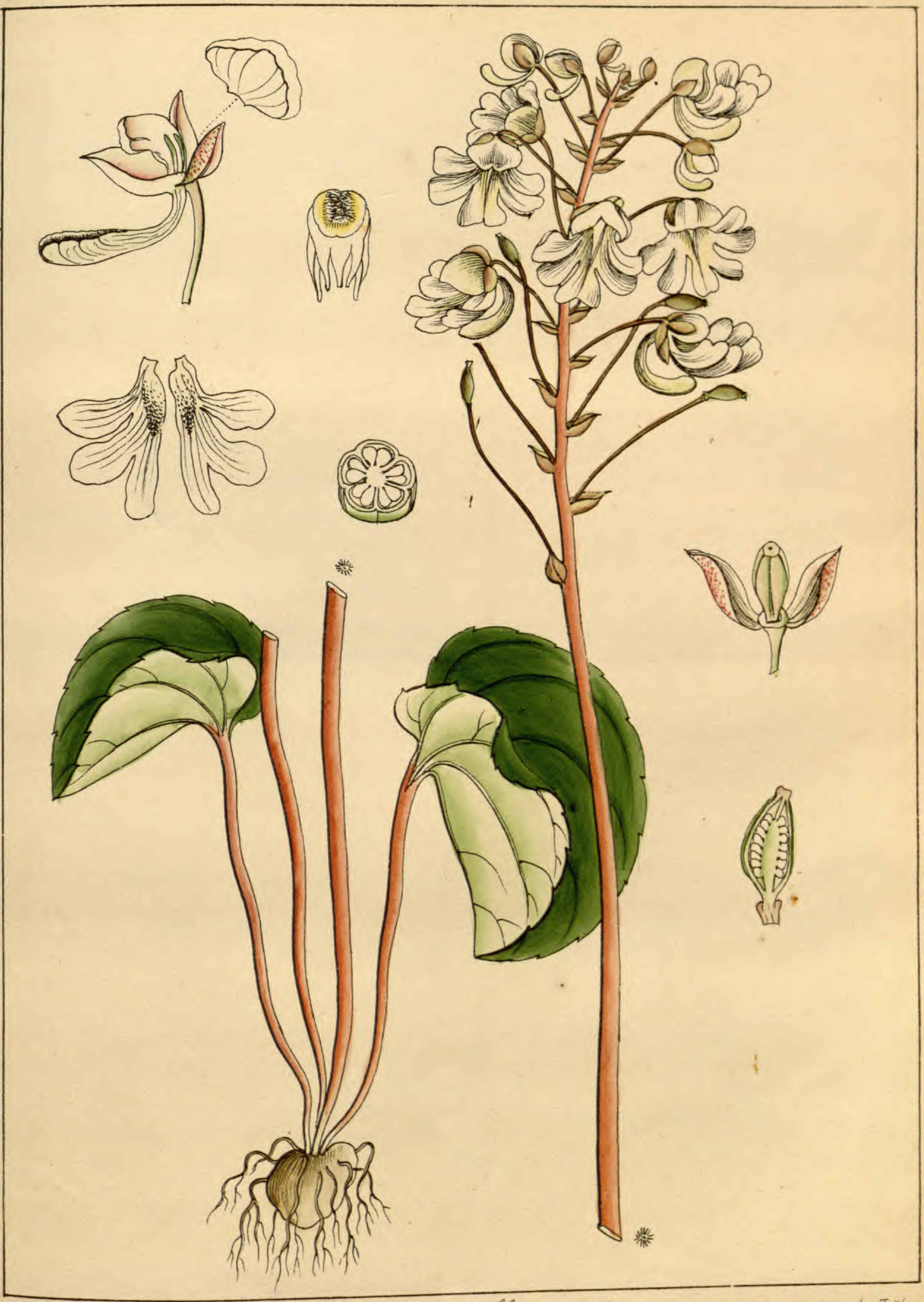
There are but two genera of this order, *Impatiens* and *Hydrocera.* The species of the former are very numerous ; of the latter three or four only are yet known. Those of the former extend from the equator as far into the Northern temperate zone as Denmark ; two are found in North America; Eastwards, they extend to Java and China, while a few are found in Southern Africa ; of *Hydrocera,* three species only are known, one Indian, frequent in Tanjore, Malabar and Ceylon, one from Java and one from Madagascar. I have only found the Indian one on the plains, never assuming an alpine character.

IMPATIENS.—*Balsam.*

Sepals 5, apparently only 4 from the union of the two upper ones. Petals 4, apparently only 2 from the union of each of the lower to each of the lateral ones. Filaments 5, more or less united at the apex : anthers opening longitudinally or transversely. Ovarium 5-celled ; cells formed by membranous

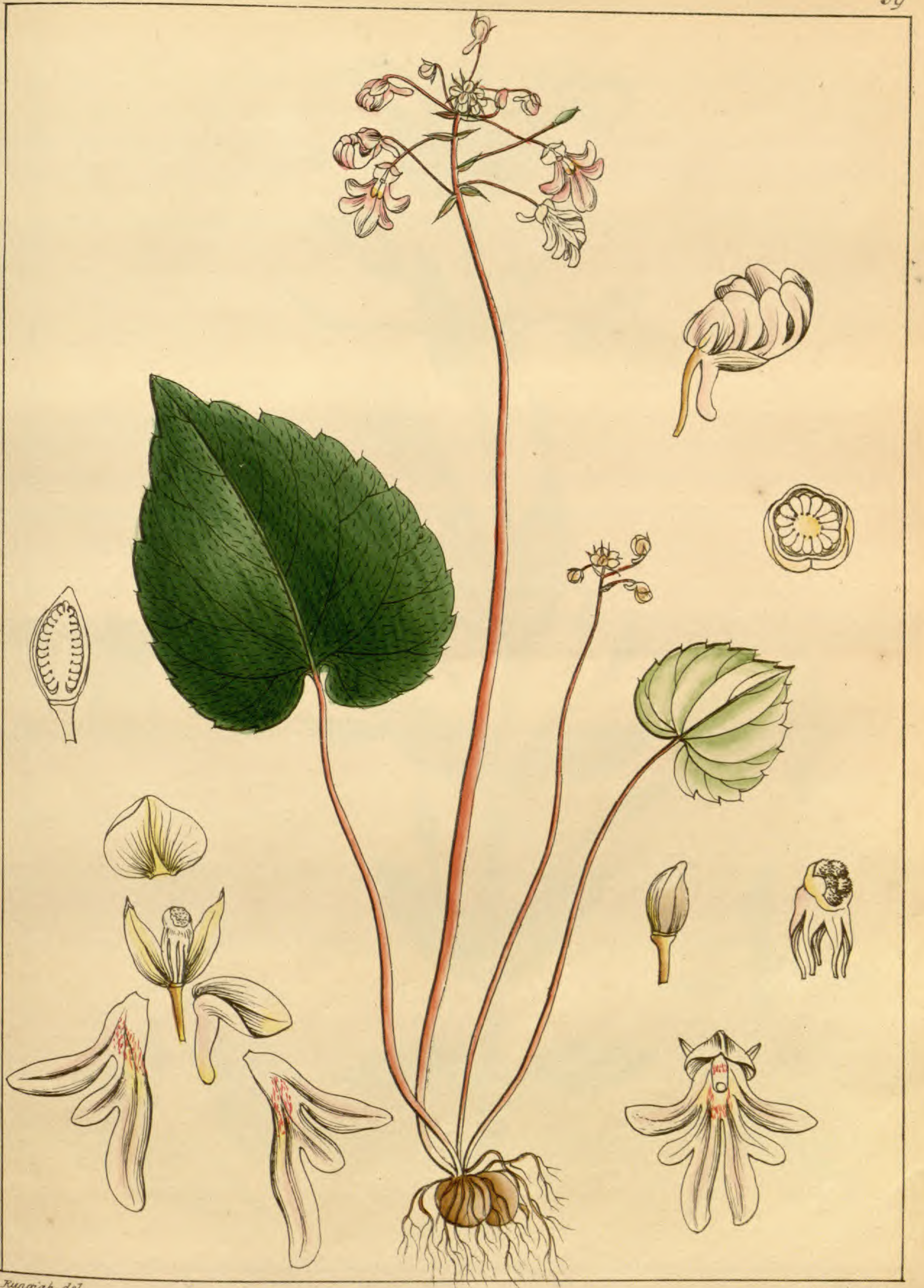
Rungiah, del. Dumphy, Lith

Impatiens fruticosa (D.C.)



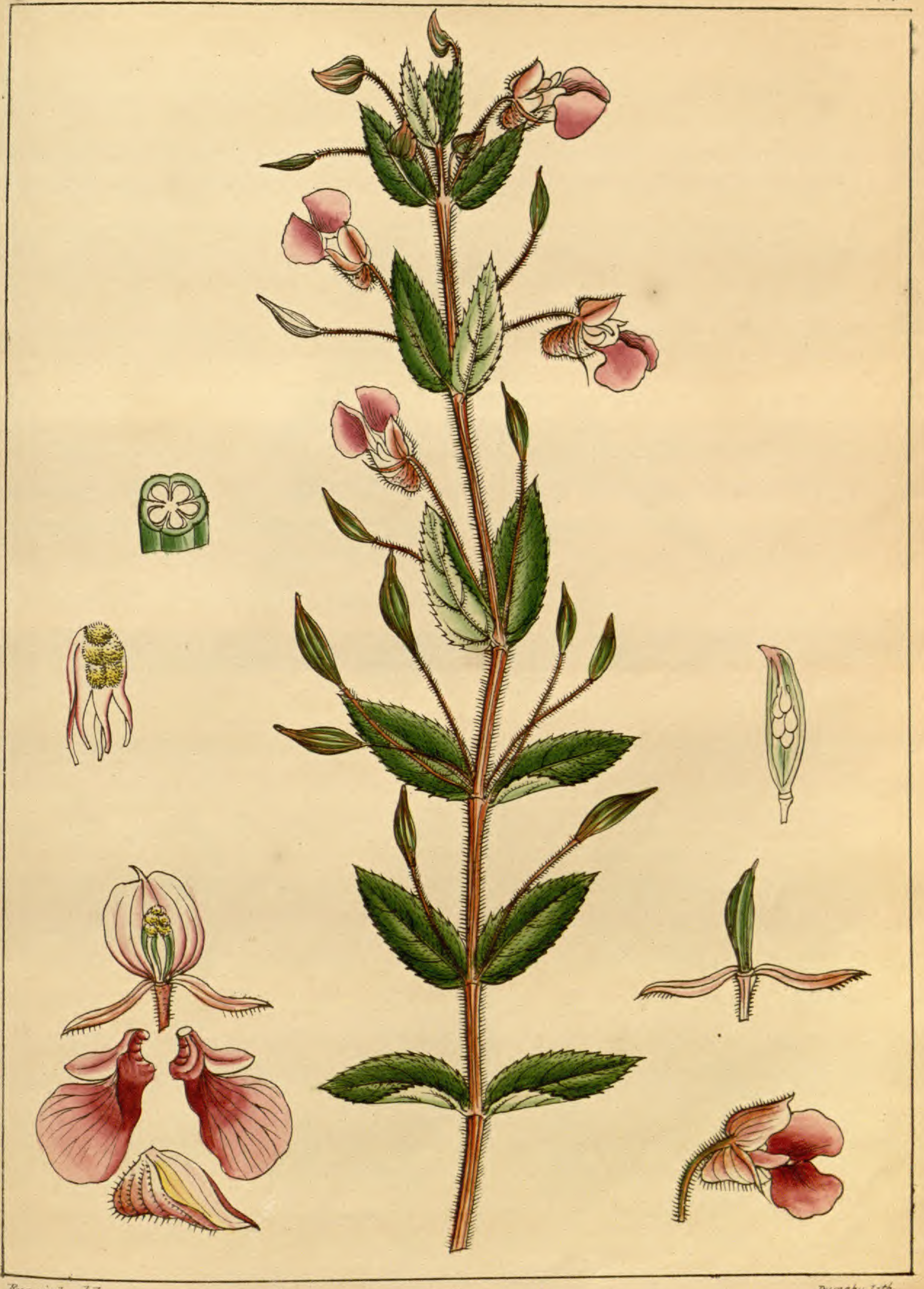
Rungiah, del. Dumphy Lith.

Impatiens scapiflora (Heyne)



Rungiah, del. Dumphy, Lith.

Impatiens modesta (R.W.)



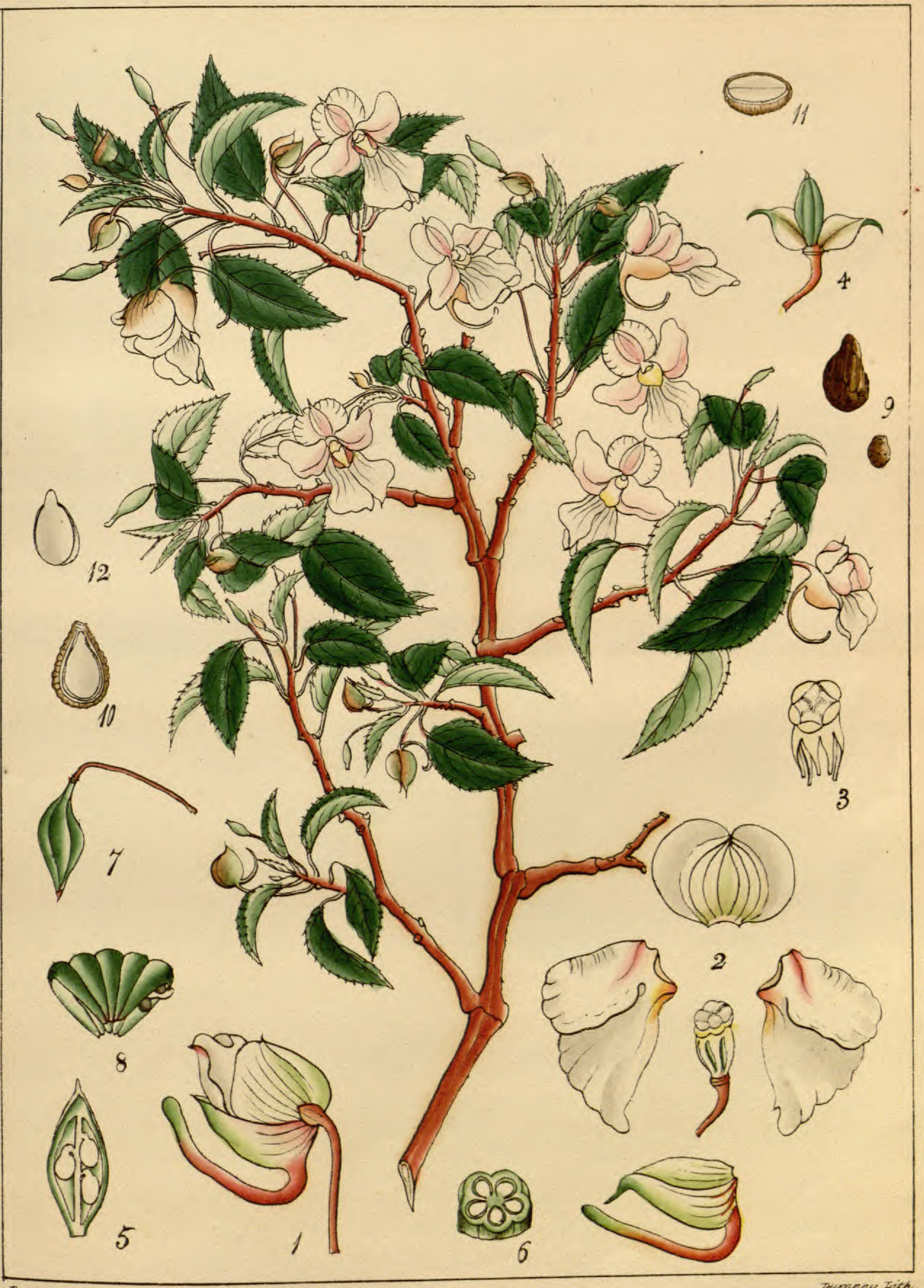
Rungiah, del. Dunphy, Lith.

Impatiens rufescens (Benth)

Rungiah, del.

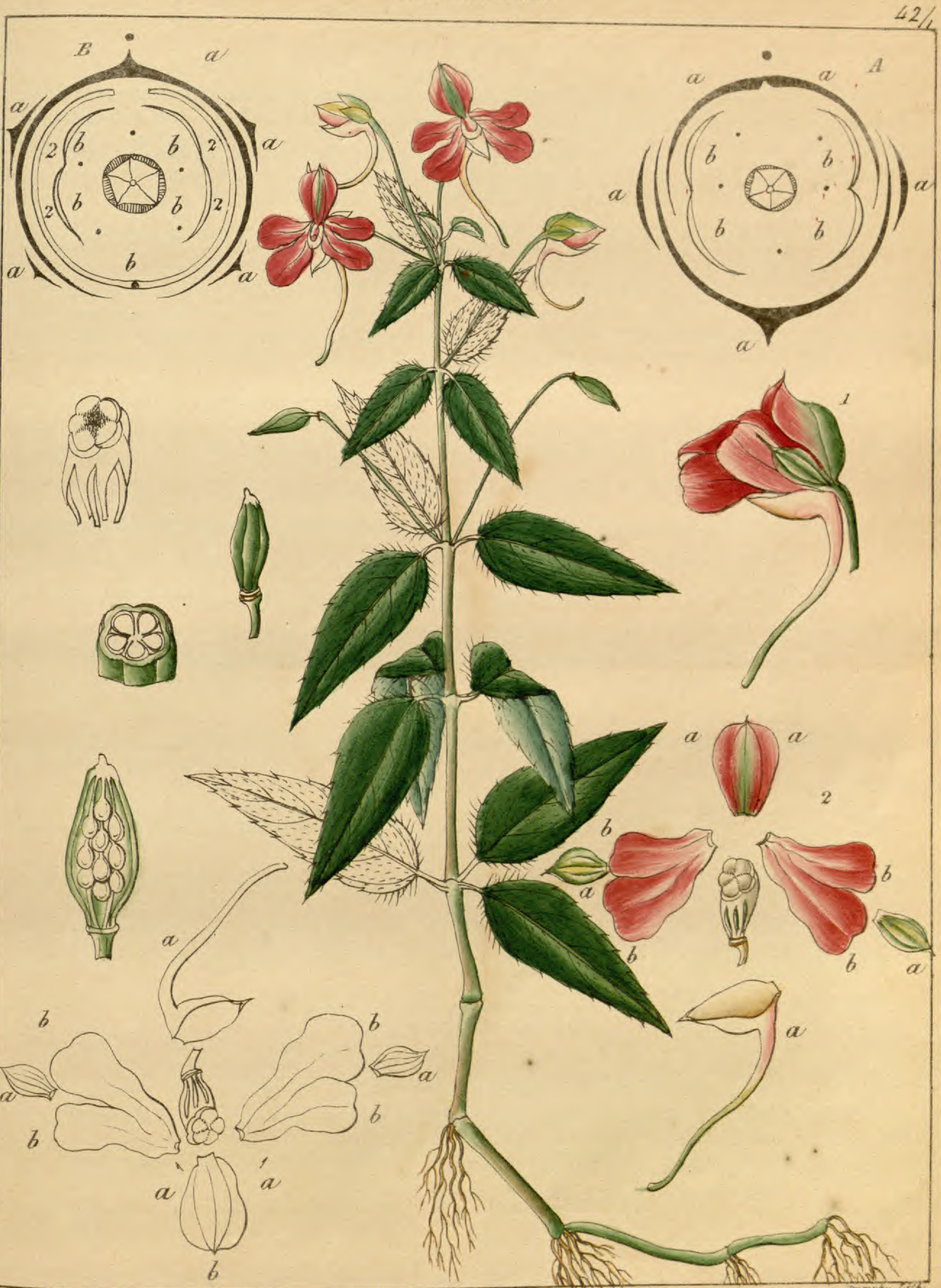
Dumphy, Lith.

Impatiens inconspicua (Benth)



Rungiah, del. Dumphy, Lith.

Impatiens Leschenaultii (Wall)



Rungiah, del. Dumphy, Lith.

Impatiens Gardneriana, R.W.

projections of the placentæ which occupy the axis of the ovary and are connected with its apex by 5 slender threads. Capsule elastically 5-valved, often 1-celled by the disappearance of the dissepiments. Seeds numerous or few.—*W. and A. Prod. p.* 135.

I here adopt our original generic character founded on Kunth's explanation of the structure of the flower, first as being easiest understood and being most consistent with appearances; and, secondly, because if I altered it, I must equally alter the characters of every species which are all drawn up in accordance with that view of their structure, and thereby do more harm, by the confusion and discordance that would be created between the two books, than would be compensated by any advantage to be derived from the more correct designation of the parts named in the description. According to Roeper's explanation; the first part of the generic character would run thus—Calyx, sepals 5, or by abortion 3, unequal, the posterior one, anticous larger, spurred or saccate at the base; lateral ones smaller, anterior pair minute or wanting. Corolla, petals 5, the anterior one posticous, suborbiculately-concave; the lateral ones united by pairs, sometimes lobed. Stamens &c., as in the character above. In a practical point of view, in the discrimination of species, no advantage would be obtained from the change.

Impatiens fruticosa (D. C.) erect, branched: stems glabrous, glaucous: leaves alternate, long-petioled; upper side hairy, particularly on the veins; under tomentose: petioles villous, glanduliferous: peduncles glabrous, shorter than the leaves, dividing into several long 1-flowered pedicels: flowers shorter than the spur: lateral sepals large, concave, roundish-ovate, acuminated: filaments united at the apex: stigmas combined: capsule glabrous, tapering at both ends.—*W. and A. Prod. p.* 137.

This noble species I have only found about Kotterghery and Coonoor, it seems to be in flower the greater part of the year. The specimen figured was gathered in August, and I afterwards found it in full flower in March. Is usually met with on the banks of streams, in clumps of jungle and in such situations I have seen it upwards of 8 feet high, nearly every branch as richly covered with flowers as the figure. This species is well adapted for showing the compound nature of the lateral petals.

Impatiens scapiflora (Heyne) glabrous: root tuberous: leaves radical, orbicular, deeply sinuate-cordate, the lobes overlapping, coriaceous; under side paler, marked with numerous coloured nerves: scape bearing a many-flowered raceme, bracteated: pedicels alternate, solitary from each bractea, slender, in fruit becoming deflexed: lateral sepals ovate, small: spur sometimes tumid and inflated, sometimes much elongated: petals 2-lobed; posterior lobe small; anterior elongated, projecting forward.—*W. and A. Prod p.* 137.

This very beautiful but unusual form of Balsam occurs in great profusion in dry pastures all over the upper range of Hills, but is most plentiful about Dodabet, flowering from July till October or November, but is in greatest perfection in September when it is most conspicuous. In this the lower half of the compound petals is lobed, affording a useful specific character.

Impatiens modesta (R. W.) leaves few, radical, broadly cordate-ovate, or sub-orbicular, hairy above; glabrous and pale shining glaucous beneath: scape erect racemose many flowered; flowers small, rather long pedicelled, from the axil of a small subulate bractea: upper sepal broad obovate or suborbicular, the lateral ones narrow lanceolate or subulate incumbent on the upper; lower shorter than the petals with a short obtuse spur: petals declining, 3 lobed (lower petal two cleft upper entire) hairy near the attachment: capsule glabrous ovate. (R. W. *Madras Journal.*)

Damp woods about Pycarah, flowering July and August. Plant from 8 to 12 inches high, leaves from 1½ to 2 inches broad flowers from 10 to 20. Petals approximated and, until closely examined, the whole flower has much the appearance of an Orchidacious plant. This description is taken from plants growing in shady woods on the top of the Hills at Shevagherry near Courtallum, but quite corresponds with the Neilgherry plant.

Impatiens rufescens (Benth.:) stems erect, branched, jointed, glabrous: leaves shortly-petioled, from elliptic and slightly cordate to obovate, sharply serrated; upper side hispid with short callous hairs; under glabrous and whitish, except the nerves which are hairy: pedicels solitary or in pairs, about the length of the leaves, villous: posterior sepals much smaller than the petals; anterior saccate, without a spur: anterior lobes of the petals oblong, protruded, much larger than the short roundish posterior one: capsule oval, glabrous.—*W. and A. Prod. p.* 138.

Frequent in swampy grounds and on the marshy sides of small streams, flowering during the rainy season, but may be met with in flower the greater part of the year near springs, where the ground is always wet. This species affords an example of the great inequality in the size of the two halves of the compound petals and of a saccate not spurred sepal.

Impatiens inconspicua (Benth.:) branched, diffuse, glabrous: leaves opposite, nearly sessile, from oval to linear-lanceolate, slightly cordate at the base, remotely and slightly bristle-serrated; under side pale, glaucous: pedicels solitary or several together, shorter than the leaves, pubescent: lateral sepals nearly equal to the flowers, linear; lower one gibbous without a spur: capsule oval, glabrous, few-seeded.—*W. and A. Prod. p.* 139.

This minute and little known species I have only found on Dodabet and on the top of the hill immediately beyond and to the south of Elk Hill: in the latter station among craggy exposed rocks. It flowers in November, and, but for its abundance where it does grow, would indeed be truly inconspicuous. This like the preceding, is distinguished by its unequal, petals and saccate not spurred sepals.

IMPATIENS LESCHENAULTII (Wall.:) suffruticose erect, branched; branches ascending, almost glabrous: leaves alternate, short petioled, ovate lanceolate, acuminated, acute at the base, glabrous, with bristly incurved serratures: petioles without glands: pedicels solitary, shorter than the leaves: lateral sepals minute, caducous: spur slender, tapering, rather longer than the flowers, curved upwards: capsules small, drooping, glabrous, ovate, pointed, few-seeded.—*W. and A. Prod. p.* 136.

This is one of the most common species on the Hills, being found in every thicket and in flower at all seasons. It is quite a shrub in its habit and often attains a considerable size. In shady woods and moist soil I have seen it fully 8 feet high. It is so nearly allied to *I. latifoila* as to be scarcely distinguishable by technical characters, but, when seen growing side by side, they are readily recognized. The flowers are pale rose colour or nearly white; those of *I. latifolia* pink and considerably larger.

IMPATIENS GARDNERIANA (R.W.) diffuse, glabrous, at first procumbent, rooting at the joints, afterwards ascending: leaves verticelled in threes, short petioled, ovate, lanceolate, acutely serrated, some of the lower serratures bristle pointed: pedicels solitary, longer than the leaves, filiform: lateral sepals ovate, acuminate, shorter than the petals, anterior ovate pointed, with a filiform spur as long as the flower and slightly gibbous at the point; posterior about the length of the posterior lobes of the petals: petals obovate, very obtuse, the upper lobes a little shorter than the larger anterior ones: capsule oblong, pointed, small, glabrous.

Western slopes of the Neilgherries about 5 miles below Sisparah in moist pasture, flowering in January and February.

I dedicate this species to my friend George Gardner Esq., superintendent of the Royal Botanic Garden, Ceylon, who accompanied me during the delightful excursion, in the course of which we found this and many other interesting novelties.

Owing to the delay which has taken place in the printing of this part I have been enabled to introduce the description of this plant in this its proper place, and the plate itself will be given in the second part, the greater part of the plates for which are already printed.

In the plate will be found two sets of diagrams A. and B. elucidating the views of Messrs. Kunth and Roeper explained above—A. representing the position of the parts as understood by Kunth B. as understood by Roeper. In these diagrams the dark lines a,a,a,a,a, represent the parts respectively called sepals by these savants, and the double lines b,b,b,b,b, the petals. From these it will be seen at a glance that, while Kunth allows only four petals, united by pairs, and 5 sepals, the upper two of them united into one, that Roeper accounts for only three sepals constantly present and 2 minute ones only occasionally found, but gives the full number of petals as always present; the upper or posterior compound sepal of Kunth being viewed by him as the anterior petal, he accounting for this reversed position of the flower on the supposition that the pedicel has got a twist in the course of its growth, a view which is supported by analogy, a similar disposition of parts being met with, in both *Trapæolum* and *Pelargonium* two nearly allied tribes. And is still further supported by the genus *Hydrocera* which is simply a regular flowered Balsam. The two dissected flowers given in the plate are similarly marked so as to show, by the corresponding letters, the parts indicated in the diagrams: the other figures require no explanation.

XXIII.—PITTOSPORIÆ.

This is a small family scarcely including, so far as yet known, 100 species. It may with propriety be considered extra-tropical, though many of its species are found within the tropics, since the bulk of the family is from the extra-tropical portions of New Holland, and the tropical ones only occur on the more elevated alpine regions. Three species at least, there may be more, are found on the Neilgherries; one abounds on the Shervaroy Hills, two are found on the more elevated regions of Ceylon; while I do not recollect having once seen one on the plains or subalpine parts of India. Mr. Brown in 1814 stated that the species of *Pittosporum* had a very wide range in both the northern and southern hemisphere, occurring in New Holland and the islands of the southern Pacific; in the Moluccas, China, Japan, and even in Madeira in the northern. Since then, the number of species has been nearly quadrupled, extending their range from Nepal southwards through India to Ceylon, the Mauritius, Cape of Good Hope, and Canaries.

Rungiah, del. Dumphy, Lith

Pittosporum tetraspermum (W & A)

In regard to the affinities of the order, Meisner has well remarked "ordo valde adhuc insertæ sedis." Brown, adverting, I presume, for I have not his paper to ascertain, to the fact that some of the species of Pittosporum had been referred to Celastrus, remarked, when indicating the order, that it is widely different from *Celastrineæ* and *Rhamneæ*, but did not mention its affinities. De Candolle, in adopting the family, placed it beside *Polygaleæ* which it certainly approaches through *Xanthophyllum*. Ach. Richard thinks it alied to *Rutaceæ* by a crowd of characters. Lindley adopts this view in the first edition of his Natural System, but groups it *Ampelideae* and *Olacineae* in his second, two orders, by the way, not very closely allied to each other. Arnott, in our Prodromus, placed it next *Celastrineae*, an arrangement which has been adopted by both Meisner and Endlicher. This, I dare say, is as correct a view as any of the preceding, but still the relationship seems far from being near. In their flowers, *Pittosporeae*, judging from *Pittosporum* alone, seem to approach *Rutaceae*, while their 2-celled ovaries erect ovules and very minute embryo at the base of a copious dense horny albumen, more nearly associcate them with *Vitis :* with *Olax* it appears to me, the relationship is remote.

In regard to the properties of the order little seems to be known. One yields finely veined timber, and the fruit of another is eatable. The seed of all the Pittosporums I know, are enveloped in a viscid resinous secretion exhaling a strong turpentine odour, which is also given out by the leaves when bruised.

PITTOSPORUM.

Sepals 5. Petals 5, the claws approaching each other, and forming a tube, Capsule 2–3-valved, 1-celled, the valves bearing the placentæ along their middle or at their base. Seeds covered with a resinous, pulp.—Shrubs with persistent entire leaves.—*W. and A. Prod. p.* 153.

This genus, as already stated, has, within the last 20 years, been vastly extended. In 1824, D.C. gave characters of 11 species ; in 1844, Walpers compiled a supplementary list of 41, which had been published in the interval, and, beyond doubt, there are still many unpublished species remaining to be added. One, if not two, I have in my Hill collections, but not yet determined. Both the Ceylon ones will, I suspect, also prove distinct from the Indian ones when opportunities occur for their comparison. The one here figured is common in the clumps of jungle about Ootacamund, flowering abundantly in February and March. The fruit require several months to attain maturity.

Pittosporum tetraspermum (W. & A,:) leaves elliptic-oblong, acute, coriaceous, glabrous, margins slightly waved and recurved : flowers in a terminal sessile umbel ; peduncles aggregated, usually 1-, rarely 2-flowered, pubescent : sepals pubescent, lanceolate, acuminated, minute, many times shorter than the corolla : petals linear : ovary hairy : style glabrous : stigmas 2-lobed : ovules 2 in each cell : capsule nearly globose, scarcely compressed, 4-seeded ; valves thick-coriaceous.—*W. and A. Prod. p.* 154.

Ootacamund in clumps of jungle : a large shrub flowering in February and March. The figure differs in two points from the character which was taken from dry specimens. The stigma is 4, not 2-lobed, and the capsules are somewhat compressed. The lobes of the stigma are at best so minute that a mistake might easily have happened, and the capsules are at first perfectly globose but become flattened when quite mature. The dark streak on the longitudinal section of the seed does not represent the embryo which the draftsman has failed to detect, being very minute and situated at the base of the seed. *P. Neilgherrense* is also found in the jungles about Ootacamund and Pycarrah ; a third undescribed species is found at Sisparah, all of which are in flower at the same time

XXIV.—CELASTRINEÆ.

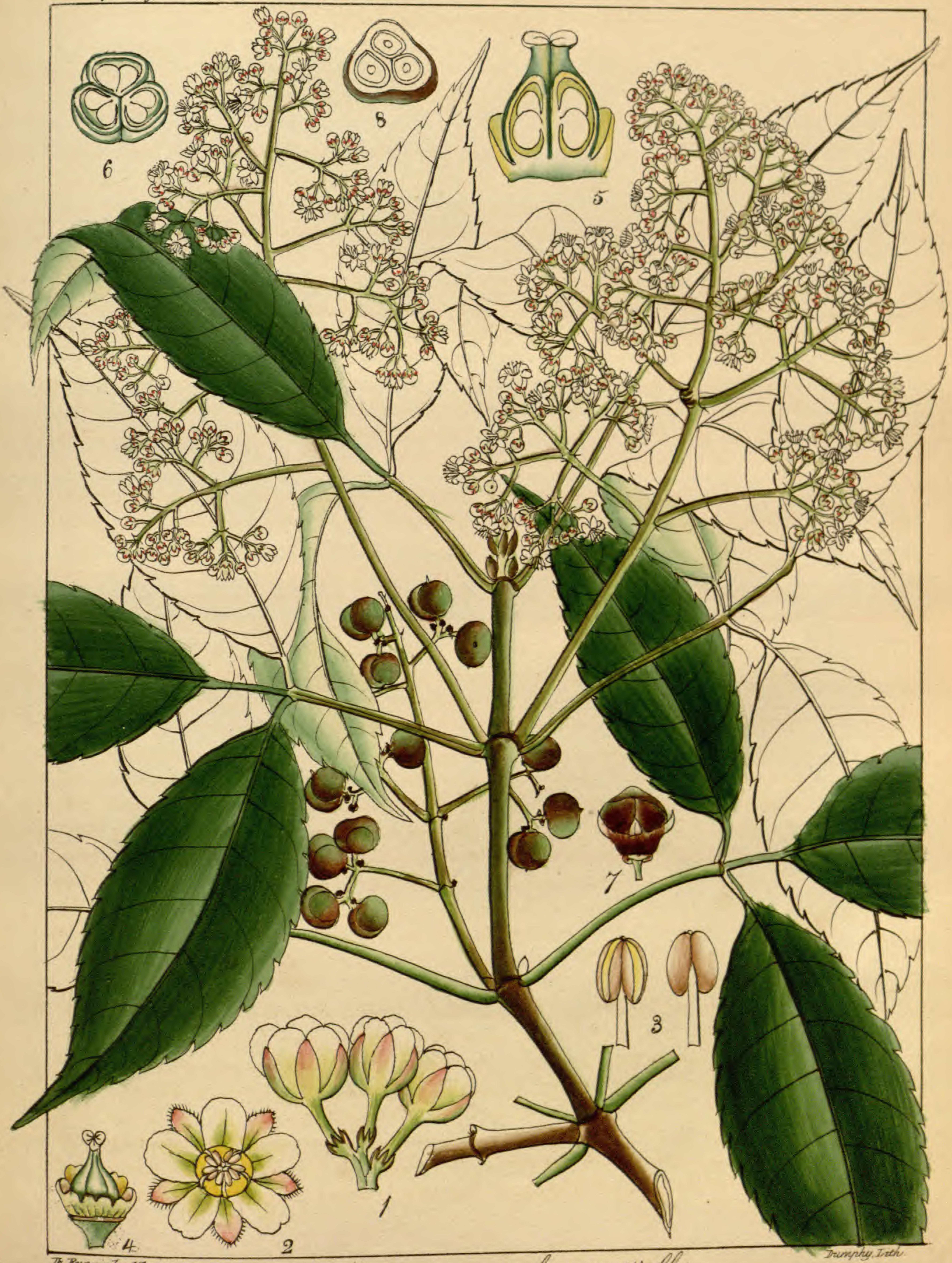
This family, though including only about 250 species, has a very wide range, every quarter of the globe claiming some of them as its own. From the equator they extend on either side far into the temperate zone, and, though frequent within the tropics, are still more abundant beyond them. Though, to this extent, an extra-tropical family, I feel yet disposed to view it as pretty equally divided, or probably even the tropical forms predominate as a tropical climate prevails many degrees beyond the tropic. The extra-tropical tendency, however, of so large a portion of the order may perhaps account for their frequency on the Neilgherries. Here we find *Turpinia*, three or four species of *Euonymus*, 4 or 5 of *Microtropis* several of *Celastrus* and high on the slopes *Pleurostylia* and *Eloeodendron*. Since the publication of DeCandolle's Prodromus the number of described species has been doubled. He divided the order into three tribes or sub-orders, *Staphyliaceæ, Celastrineæ* and *Aquifoliaceæ* or *Ilicineæ*. More recent writers have elevated each of these to the rank of distinct orders. This arrangement I only partly adopt here.

The distinction between *Staphyliaceae* and *Celastrineae* rests principally on habit, the former having compound, the latter simple, leaves. Beyond that I can discover no essential difference, and that, judging from analogy, seems scarcely deserving of having so high a value assigned to it. As a sectional character it is good, but scarcely amounts to an ordinal distinction, I have therefore preserved DeCandolle's section in preference to adopting Lindley and Bartling's order, though the latter has been taken up by Endlicher and others. *Aquifoliaceae*, on the other hand, have been removed from this to the following sub-class, on account of a difference in the position of the petals and stamens relatively to the ovary.

In all the preceding orders these parts are said to be Hypogynous, that is, attached close under, or, as it were, round the neck of the ovary, and not into the calyx. In this and the following they are attached to the calyx, distinct from the ovary, and hence are said to be Perigynous, that is placed round about (not under) the pistil. In the former, the sepals may, and sometimes do, drop leaving the corolla and stamens, in the latter that cannot happen : here they may, and generally do, fall leaving the calyx, but the calyx cannot fall, leaving them. In the perigynous orders the calyx is moreover generally more or less tubular at the base, and lined with what is called a disk or torus to which the petals and stamens are attached. DeCandolle, availing himself of these structural differences, has grouped together all the orders in which they are found to form his sub-class of *Calyciflorae*, in contradistinction to the Hypogynous orders, of which he forms another sub-class under the designation of *Thalamiflorae*.

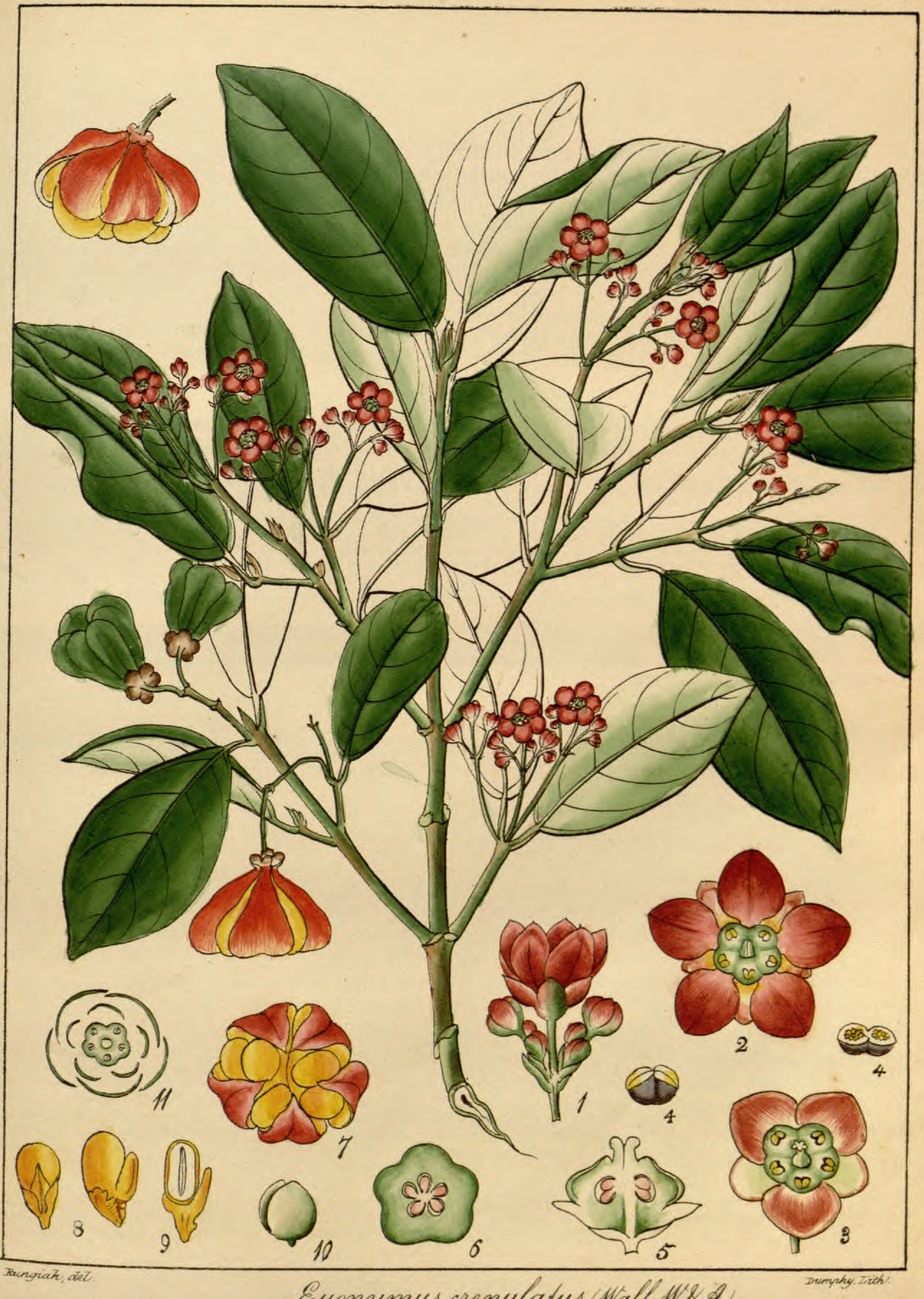
His third tribe *Aquifoliaceae* differs from the rest of the order in having a monopetalous hypogynous corolla bearing the stamens : it has therefore been removed, and formed into a new order, under the name of *Ilicineae*, and placed in the next sub-class distinguished by having their petals cohering, forming a Monopetalous Corolla, with an inferior attachment, which he has distingushed by the name of *Corollifloreae*.

These explanations of this part of DeCandolle's system I have deemed necessary, to show the grounds on which more recent observers have departed from the arrangement of that great Botanist, in removing one of his sections to form a distinct order in a different sub-class.



Dr Rungeah, del. Dumphy, Lith.

Turpinia nepalensis (Wall)



Rungiah, del. Dumphy, Lith.

Euonymus crenulatus (Wall W&A)

TURPENIA.

Flowers polygamous or bisexual. Calyx 5-partite, persistent. Petals 5. Torus discoid, with a free 10-crenulated margin. Stamens 5, inserted under the margin of the disk, alternate with the petals : anthers ovate, dehiscing longitudinally. Carpels 3, follicular, at first distinct or separable, soon combining into one ovary, lower part immersed in the disk : ovules 2-8 in each carpel. Styles 3, separable. Stigmas patent, flat, cuneate. Fruit baccate, 3-celled (or with fewer cells by abortion). Seeds 1-3 in each cell, bony and shining, truncated at the hilum, fixed along the axis or to its apex. Albumen fleshy.—Trees or shrubs. Leaves opposite, unequally pinnated ; leaflets coriaceous, glabrous, stalked, ovate or oblong, acuminated, serrated. Flowers white, panicled : branches of the panicle alternate (in the American species) or opposite (in the Indian).—*W. and A. Prod. p.* 156.

Only 5 species of this genus are yet known, one of which, is a native of Mexico, two inhabit Jamaica, and two India. One occurs at Newera Ellea in Ceylon, apparently distinct from, but very nearly related to, ours; both are moderate sized, very ramous trees, the leaves pinnate, with from 3 to 5 leaflets, and corymbose inflorescence.

Turpinia nepalensis (Wall.:) leaflets 3-5, oblong lanceolate, acuminated, coriaceous : branches of the panicle opposite : styles almost quite distinct : ovules 3, or occasionally 2, in each cell : berry (immature) scarcely fleshy, marked on the outside above the middle with 3 small distant points (the remains of the styles), about 3-seeded : seeds pendulous : radicle superior.—*W. and A. Prod .p.* 156.

A very common tree on the Hills, and to be found more or less perfectly in flower at all seasons, but in greatest perfection in May and June. It seldom attains a considerable height ; but its branches when it has room to spread, extend on all sides forming a fine head.

EUONYMUS.—*Spindle tree.*

Calyx 4-5-parted. Petals 4-5, sessile. Torus a fleshy orbicular disk. Stamens 4-5, inserted on the surface of the disk, between the margin and ovary : base of the filaments persistent, and forming glandular projections on the torus: anthers with a thick connectivum at the back, opening transversely or longitudinally. Ovary immersed in the disk, with as many cells as petals : ovules 2 in each cell. Style short and thick. Stigmas united into one, obtuse or lobed. Capsules 4-5-celled, 4-5-valved, loculicidal. Seeds 1-2 in each cell.—Trees or shrubs, sometimes climbing by means of roots thrown out by the stems. Leaves opposite. Peduncles axillary. Flowers occasionally with a fourth or fifth part additional.—*W. and A. Prod. p.* 160.

This is a large genus inhabiting Europe, Asia and America, and generally found in the more temperate regions of those tropical countries where it occurs. There are now nearly 50 known species. They are not easy of discrimination, the genus being a very natural one, with a strong family likeness running through the whole. Three, probably more, are found on the Hills, namely, the one delineated, by far the most abundant; another very like, but abundantly distinct, occurring on the western slopes below Sisparah, which like this, attains the size of a tree, the third, *E. Goughii*, I have not myself found, *and E. India ?*

Euonymus crenulatus (Wall.:) leaves elliptical, obtuse, short petioled, crenulate-serrated towards the apex, coriaceous, convex and bullate above : peduncles solitary, shorter than the leaves, once or twice dichotomous, few-flowered : petals 5 (or occasionally 6) orbicular : stamens very short ; anthers opening transversely : margin of the torus free : style very short : stigma blunt, somewhat umbilicated : capsules turbinate, 5-celled, lobed at the apex : seed solitary in each cell ; hilum truncate, without an arillus.—*W. and A. Prod. p.* 161.

This plant often attains the size of a considerable tree ; but more commonly it occurs as a large and often very handsome shrub, on account of its numerous ascending branches covered with abundance of bright shining foliage. The flowers, as seen on the growing plant, are but little conspicuous being small and hid by the profusion of leaves. They are of a dull purple colour, and not generally so numerous as on the specimen selected for representation. In the above character of the species, the seed are said to be without an arillus. This is not quite correct. The arillus is present but much smaller than usual in the genus. One of the ovules only in each cell usually matures, the remains of the other is shown in figures 8 and 9, sometimes, however, they both ripen.

MICROTROPIS.

Calyx 5, parted imbricated, corolla 5-petaled perigynous inserted into the outer edge of an annular disk, æstivation imbricated. Stamens alternate with the petals rising from the edge of the disk. Anthers introrse, dehiscing longitudinally, sometimes alternating with short epipelatous scales (squamulæ 5, breves, epipetalæ staminibus alternates. Arn.) Ovary semi-superior 2-celled with 2 dependent collateral ovules in each: style short, conical: stigma obtuse, obscurely four-lobed. Capsule superior 1-celled, two-valved, but usually dehiscing on one side only. Seed solitary, rarely paired, erect: testa thin, succulent, coloured. Embryo, erect, enclosed in a copious firm tenacious albumen: cotyledons foliaceous: radicle cylindrical.

Shrubs or trees, leaves entire opposite. exstipulate, glabrous, shining, coriaceous. Cymes axillary or from the scars of fallen leaves, either furnished with longish peduncles or subsessile, forming dense capitulæ on the older branches. Flowers small white, sepals and petals orbicular concave, very coriaceous. Fruit capsular, oval oblong pointed with the persistent base of the style; capsule corticose (resembling bark in colour and texture) testa thin, friable, somewhat resembling semi-indurated pulp, and, in all species I have seen, deeply coloured: albumen tenacious, translucent, easily sectile: cotyledons, when fresh gathered, green, but not quite so deeply coloured as represented in the plates.

This genus was named by Dr. Wallich, but without a character, in his List of Indian plants. Lindley adopted it in his Natural System but without defining it. Dr. Meisner and Arnott having got specimens, both published characters quite independent of each other. Their generic characters are both good so far as their imperfect materials enabled them to go, but both admit of alterations. The materials in my hands being more perfect than those they had, has induced me to endeavour to render more perfect their characters. The part I have described as the testa of the seed, Roxburgh has called an arillus (" *Semina solitaria arillo tenui succulento involuta.*" Arnott from Roxb.) I do so from finding no other part corresponding to that organ, from its completely investing the seed, without any opening, which a true arillus must have, and from its being distinctly vascular, showing that it cannot be merely indurated pulp. I have not observed in any of the Hill species the epipetalous scales mentioned by Arnott. In Arnott's character the ovules are said to be ascending, in all the Neilgherry species the ovules are pendulous, the seed erect, and the radicle inferior. How this change of position is brought about still remains for investigation.

When Dr. Arnott published his remarks on this genus, he doubted whether it belonged to this order, a point on which there cannot, I think, be any longer a doubt, even supposing the corolla gamopetalous. This it certainly is not, but polypetalous, the petals attached to a disk. This structure is most easily made out in the unopened flower bud.

Microtropis microcarpa (R. W.) an erect shrub: leaves opposite ovate, mucronate, entire, glabrous, shining above, glaucous beneath: petals obovate cuniate broad at the apex, cymes axillary, dichotomous shorter than the leaves, capsule subcylindrical slightly attenuated at the base, pointed, testa of a rusty brown colour.

Kottergherry, in dry jungles, flowering July and August, at the same time bearing clusters of ripe seed. The shrubs from which the specimens were taken were 8 or 10 feet high, branches, ascending leaves ovate from 12 to 15 lines long, 4 to 6 broad. The flowers had not quite opened at that time and the open flower, figure 2 was opened artificially. No. 1 shows the unopened corolla after the removal of the calyx.

Microtropis ovalifolia (R. W.) a large somewhat diffusely ramous shrub: leaves oval, rounded at both ends: cymes axillary, trichotomous shorter than the leaves: petals orbicular, fruit oblong oval, obtuse, testa crimson.

Ootacamund, frequent in moist woods, flowering in February and March, but may generally be found in flower at other seasons.

In their outline the leaves are very constant, but are often much larger than those represented, being sometimes nearly 2¼ inches long by 1½ broad. These two are very nearly allied species but, I think, quite distinct.

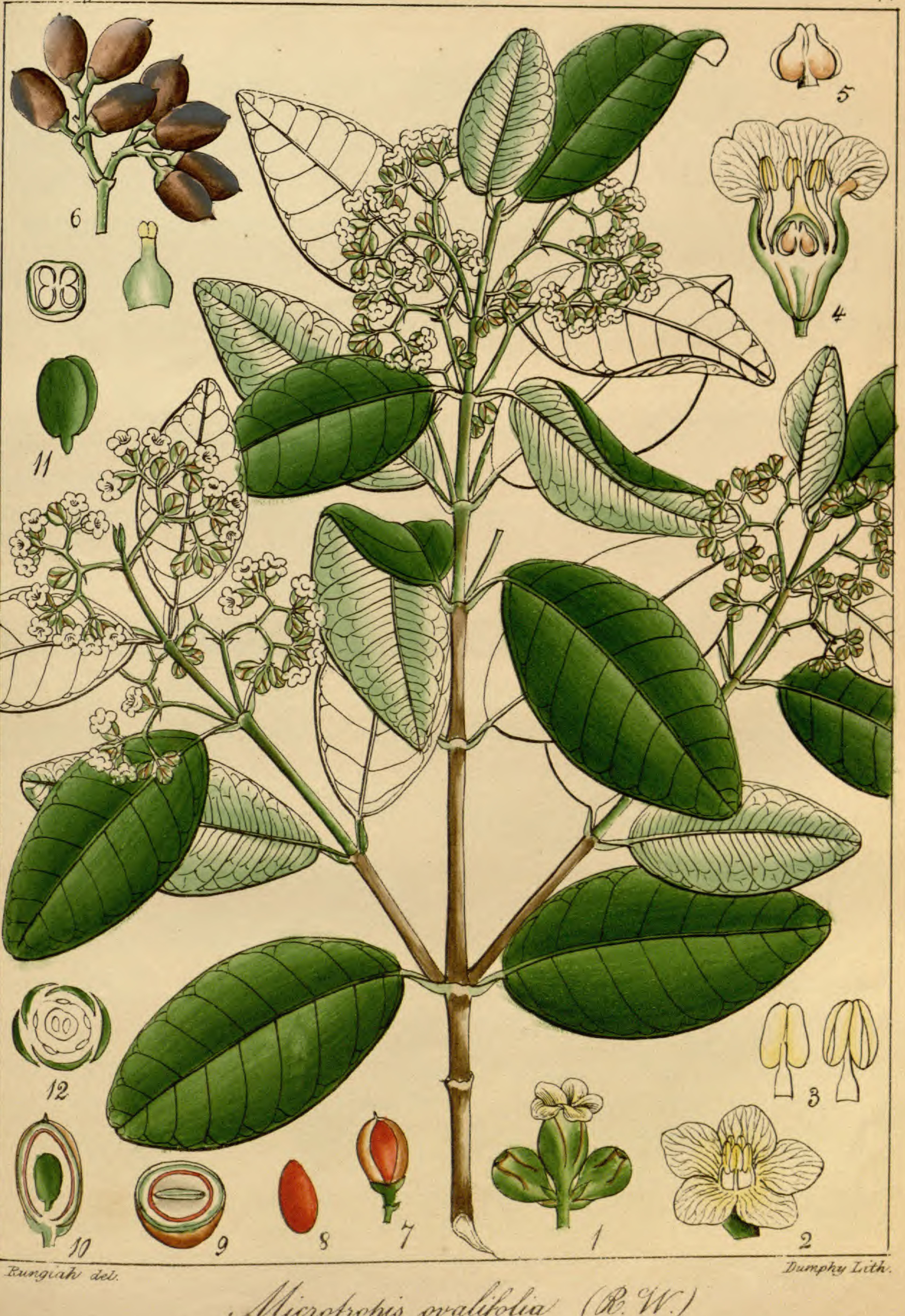
Microtropis ramiflora (R. W.) a moderate sized tree: leaves subsessile, slightly cordate at the base obovate obtuse or slightly emarginate reflexed, very coriaceous: flower subsessile, aggregated in dense clusters along the naked branches: petals somewhat obovate: fruit oblong obtuse: testa of a redish orange colour.

Ootacamund in thick jungles. This is the largest species I have yet met with, being quite arborious. The leaves are from two to three inches long by about 2 broad, exceedingly hard and coriaceous. When in full flower, all the younger branches are as densely covered with flowers as in the specimen figured.

There are three or four other species found on the hills, two referrible to the ramiflorous division, and another, or perhaps, two, to the cymose.

Rungiah del. Dumphy Lith.

Microtropis microcarpa (R.W.)



Rungiah del. Dumphy Lith.

Microtropis ovalifolia (R. W.)

Rungiah, del. Dumphy, Lith.

Microtropis ramiflora (R.W.)

XXV.—RHAMNEÆ.

This is a family of considerable extent as regards the number of species and is very widely distributed over the world. De Candolle, in 1825, defined 230 species; and, if the increase has been in the same ratio as *Celastrineae,* we may with safety assume that it now includes 400 known species. Though most abundant in the lower latitudes of the temperate zones, it yet extends to near there extreme limits in both hemispheres but has not been found beyond. Within the tropics they are also numerous. This being, however, upon the whole, a more decidedly extra-tropical than Tropical family, it seems rather curious that so few species are found on the higher ranges of the Neilgherries. I can only at this time recollect three decidedly mountain species, two of *Rhamnus* and one of *Scuttia* the latter still undescribed and which I should have introduced here had I sooner become acquainted with it. This family was formerly combined with *Celastrineae* but is readily distinguished by the form and position of the petals. Here they are small, scale-like, and placed immediately behind the stamens, not alternate with them as in *Celastrineae.* This is a character of greater value than might at first sight be supposed as it indicates that one series or row of stamens has been suppressed. In a regularly formed flower each series of parts is alternate with the one behind; hence, the petals are alternate with the sepals, the first row stamens with the petals, but opposite the sepals, the second row alternate with the sepals but opposite the petals. If the stamens are equal in number with the petals, and opposite to them; it indicates that the first row, which would have been alternate, is suppressed. This then, is the principal distinguishing mark between *Rhamneae* and *Celastrineae,* which are in other respects nearly related.

The affinities of these two orders are not by any means clear to me. That they are very nearly related to each other is certain: that they are nearly related to *Terebinthaceae* seems also certain. Lindley has, moreover, long insisted on the near relationship existing between them and *Euphorbiaceae.* That this order is related especially to *Rhamneae* is unquestionable, whether so closely as to entitle *Euphorbiaceae* to be placed between *Rhamneae* and *Celastrineae* is, to my mind, questionable; though, to be sure, it is small matter which is first or last so long as really nearly related orders are brought together and formed into family groups in the manner attempted by Lindley in his alliances, and by Endlicher in his clapis.

In its economical relations this is, perhaps, a more important order than the preceding, though its properties are of very mixed and anomalous character. The berries of *Rhamnes catharticus* are a violently cathartic and under the name of Buckthorn were formerly employed a good deal in medicine. The juice of them made into a syrup is still occasionally so employed. The same juice mixed with a little alum and evaporated to a proper consistence affords the colour called sap green. As a contrast to that, the fruit of the Jujube tree *Zizyphus Jujuba,* is edible, so also are the succulent peduncles of the *Hovenia dulcis* a Chinese plant of this family, while the leaves of *Segeretia Theezans* another Chinese plant of the order, are used by the poorer classes there as a substitute for tea. Such anomalies in so natural a family are of rare occurrence.

RHAMNUS.—*Buckthorn.*

Calyx urceolate, 4-5-cleft. Petals wanting; or 4-5, either nearly flat, or slightly convolute and emarginate at the apex. Stamens with ovate 2-celled anthers. Torus thin, lining the tube of the calyx. Ovary free from the calyx and not immersed in the torus, 2-3-4-celled. Styles 2-4, more or less, connected or distinct. Fruit fleshy, containing 2-4 indehiscent cartilaginous nuts; one of them occasionally abortive. —Shrubs or small trees. Leaves alternate or rarely opposite, stipuled, short-stalked, feather-nerved.—*W. and A. Prod. p.* 164.

Only two species of this genus are known in Southern India both of which occur in considerable abundance on the hills, but more especially *R. Wightii*, which is very abundant in the thickets about Ootacamund. In appearance it does not agree well with the one here represented, and perhaps it may be doubted whether it ought to be looked upon as a true *Rhamnus*: but while my acquaintance with this genus is so limited I cannot venture to separate it. The other is I think a genuine Rhamnus and very nearly related to the original species *R. Catharticus.*

Rhamnus hirsuta. (W. & A.:) young branches pubescent, spinescent; older ones glabrous with a white cuticle: leaves opposite or alternate, ovate, or oblong lanceolate, with a short sudden acumination, serrulated, membranaceous, nearly glabrous above, beneath hairy, perticularly on the nerves and veins; pedicels from the base of the young shoots, 3-6 together, pubescent, as long as the petiole: calyx 4-cleft: petals obovate, obtuse, entire, flat: ovary 2-3 celled: styles 2-3, connected to the middle, then diverging; the upper part jointed with and deciduous from the persistent lower half: fruit 2-celled: seeds plano-convex, with a deep furrow at the base on the outer convex side.—*W. and A. Prod. p.* 165.

A considerable shrub rather extensively distributed on the Hills, but not so common on the higher ranges as lower down. The specimen delineated supplies a somewhat flattering likeness as it usually presents a rather scraggy appearance. It is to be met with in a flower at almost all seasons, but is not so free as the other in bearing fruit.

GOUANIA.

Calyx 5-cleft; segments spreading. Petals 5, convolute or cucullate. Stamens 5, enclosed within the petals: anthers ovate, 2-celled. Disk concave or flattish, 5-angled, the angles opposite to the petals; the sides usually produced opposite to the calycine-segment, and forming a stellate disk, the accessory angles being either entire or 2-horned or truncated. Ovary connate with the bottom of the tube of the calyx, covered over by the disk, 3-celled. Style 3-fid. Fruit inferior, with 3 angles or keels or wings, consisting of 3 separable dry coriaceous compressed indehiscent carpels (*mericarps*), which are attached to a central tripartite filiform receptacle.—Usually climbing shrubs, with the branches often, from abortion, converted into tendrils. Leaves stipulated, alternate, feather-nerved, somewhat 3-nervad at the base from the lower nerves being largest and arched. Flowers usually fascicled on leafless branches, forming interrupted spikes or cacemes, rarely umbellate or racemose in the axils of the upper leaves. Fruit, as in the Umbelliferæ, but consisting of 3 instead of 2 mericarps.

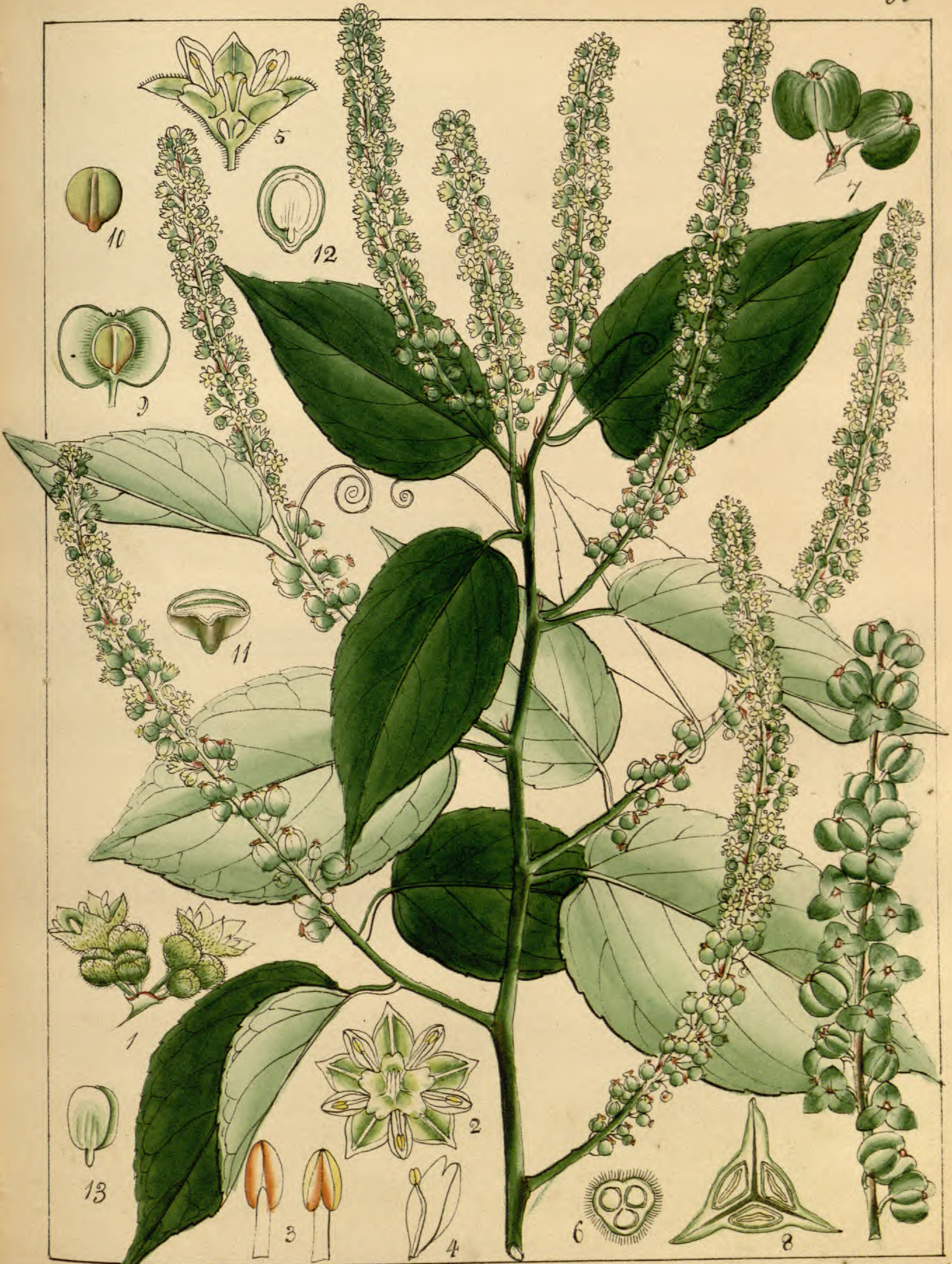
This genus partakes much more of the tropial character than the other and is only found on the lower slopes. The specimen figured was gathered some distance below Coonoor. Only one other species is found in Southern India. They are both rambling scandent shrubs, clinging by means of their tendrils to others among which they grow.—*W. and A. Prod. p.* 166.

Gouania leptostachya (D. C.:) branches glabrous: leaves ovate, acuminated, slightly cordate at the base, coarsely crenate-serrated, glabrous: racemes interrupted, axillary or in terminal panicles, elongated, when young, pubescent, afterwards glabrous: flowers on very short pedicels, polygamous: disk glabrous, stellate; accessory angles partly adnate to the calycine lobes, free and acuminated towards the two-horned apex: fruit glabrous, shortly winged,—*W. and A. Prod. p.* 166.

An extensively straggling climbing shrub, found in great abundance along the road between Burliar and Coonoor, flowering towards the end of the year and maturing its fruit during the hot season. We formerly supposed this species confined to the Northern parts of Peninsula, a point on which, it now appears we were mistaken.

Rungiah, del. Dumphy, lith.

Rhamnus hirsuta (W. & A.)



Rungiah del. Dumphy, lith.

Gouania leptostachya (D.C)

XXVI.—LEGUMINOSÆ.

This is a most extensive and interesting family of plants second only to *Compositæ* in the number of its species and, viewed in connection with its economical relations to man, casting that gigantic Natural order far into the shade. This is indeed a splendid family being, in every point of view except the mere number of its species, the first of the vegetable kingdom and even as regards number, the difference between it and *Compositæ* is by no means so great as was once supposed. It was, I have heard, the belief of Professor DeCandolle when entering on the herculian task of preparing, for his invaluable prodromus, a synoptical monograph of Compositæ that that family included about 14,000 species: but when the whole were brought to light the actual number proved to be little more than half, or about 8000, to which probably about 1000 have since been added. The number of *Leguminosæ* described by him 20 years ago in the same work, was about 3,500 species. Since then the number has been nearly, if not actually, doubled, thus placing those two great orders more nearly on a par than could have been anticipated.

This family embraces within its extended limits some of the largest trees of the forest and the smallest herbs of the meadow: it supplies man with much wholesome food for himself and excellent fodder for his cattle, with some valuable medicines and numerous drugs, useful in the arts; the trees supply him with abundance of valuable timber, while the bark provides cordage and coarse cloth. Such are some of the numerous claims of this family to his attention and consideration in an economical point of view, exclusive of the gratification he derives from their comtemplation as ornamental objects suited to gratify the senses by the beauty of their forms and the elegance and fragrance of their numerous rich and variously coloured flowers.

This Natural order of plants naturally divides itself into two principal sections, distinguished in the first instance by the direction of the radicle of the seed, namely into *Curvembriæ* having the radicle bent down on the edge of the cotyledons and *Rectembriæ* having the radicle straight. These distinctions are easily ascertained by merely peeling a seed and observing the direction of the growing points. The plants thus separated by that minute point of structure are more widely severed by other marks taken from the habit, inflorescence, and form of the flowers; and also by properties.

To the first of these divisions belong the vast tribe of *Papilionaceæ* including peas, beans, in a word the whole Pulse family. In this division the flowers, with a few exceptions, are all papilionacious, or pea flowered: a name derived from some fanciful resemblance they bear to a butterfly. To the second belong *Cæsalpineæ* including the bonduc, sapan, logwood, senna, &c., all having more or less regular flowers, and the *Mimoseæ* in which they are perfectly regular and otherwise very dissimilar from the rest of the order, but which is at once recognized as belonging to it by the presence of a legume. These two sections thus afford a beautiful and striking example of the value of characters derived from the seed which, though minute and apparently in themselves of small moment, are yet, when followed out, indicative of the greatest differences in the characters of the vegetation.

This can be shown in another way, thus. The *Curvembriate* section, according to DeCandolle's enumeration contains about 2,604 species. Of these 910 are natives of the equinoctial zone, and 1,277 of the northern hemisphere beyond the tropic, the remaining 417 of the southern. The *Rectembriæ* amount to 829, of these 692 are tropical, 35 are natives of the northern hemisphere beyond the tropics, the remaining 102 belong to the southern hemisphere where the *Mimoseæ* greatly abound. These examples show that the Rectembriæ are comparatively tropical in their distribution while the Curvembriæ have a more marked extra-tropical tendency. This fact is curiously confirmed by what we find on the Hills. Here, so far as I can at present recollect, only three or four native species of Rectembriæ are found, and even one of those a doubtful native, while the Curvembriæ abound. On the slopes and near the bottom of the Hills the Rectembriæ attain their usual tropical proportion. These are interesting facts in regard to Botanical Geography.

In their affinities *Leguminosæ* approach most nearly to *Rosaceæ* so nearly indeed, that when the extreme forms of each family are compared, but one constant distinguishing mark is found by which to separate them, and that derived from the flower. In *Leguminosæ* two sepals and one petal, the odd one, are next the axis or branch on which it grows: in *Rosaceæ* one sepal, the odd one, and two petals are next the axis. This is invariable !

It may, and with much reason, be asked what possible relationship can exist between a pea pod and a cherry or peach, or in other words between a legume and a drupe or apple, the former the fruit of a Leguminous plant, the latter of a Rosaceous one. Strange as it may appear, the relationship is much closer than could at first sight be suspected. A pea shell is composed of a soft tender outside skin lined with a dense tough parchment like membrane which can be easily peeled off. A cherry or peach in like manner has a soft pulpy outside, lined with a hard bony shell forming the stone, which contains the kernel. The pulp and stone correspond therefore with the two parts of the pea shell and the kernel with the pea. And there are one and two seeded pods, as well as one and two kernelled drupes. Here then we find the same parts in both, only differing in texture. And when the comparison is carried further we find in some genera succulent pods on the one hand and less pulpy drupes on the other, until the two actually meet in *Ditarium*, a leguminous genus with drupaceous pods, which, but for the floral character, must have been referred to *Rosaceæ*. In the apple and pear too we find the cells of the fruit lined with parchment-like membrane the same as the pod and covered like it with a fleshy outside only more abundant: an apple then or pear is simply a congeries of 5 pods ranged round an axis enveloped in a common pulp and enclosed in a single enlarged and adherent calyx. *Leguminosæ* have relationships with many other orders but none so near or so striking as with *Rosaceæ*.

SOPHORA.

Calyx 5-toothed, campanulate, or somewhat attenuated at the base. Petals of the keel usually combined at their apex. Legume moniliform, not winged, several seeded.—Trees, shrubs, or herbaceous plants. Leaves irregularly pinnated, often without stipules. Racemes terminal, simple or panicled.—*W. and A. Prod. p.* 179.

This is a widely diffused genus though as yet only 17 species are described. Siberia, Nepaul, China, Neilgherries, Ceylon, Havanah, Brazil and Peru, have each one or more species. The one here given is the

Rungiah, del. Dumphy, Lith.

Sophora glauca (Lesch)

Rungiah, del. Dumphy, Lith.

Crotalaria barbata (Graham)

Rungiah, del. Dumphy, Lith.

Crotalaria formosa (Graham)

Rungiah del. Dumphy Lith.

Crotalania Wallichiana (W & A.)

only one I have seen on the Hills, but Captain Munro found a second with red seed apparently *S. heptaphylla* which he discovered in jungles below Nedawuttem.

DeCandolle places the tribe *Sophoreæ* at the head of his arrangement, Endlicher, I think with advantage removes it to a station more advanced, placing it next *Casalpineæ* to which they approach through their free stamens, thus forming a connecting link between the Curvembriæ and Rectembriæ, having the Papilionaceous Corolla of the former, and the free stamens of the latter, the radicle being, moreover, less distinctly curved than in the true *Papilionaceæ* and sometimes even straight.

SOPHORA GLAUCA (Lesch.) shrubby: leaflets 19-23, elliptical, mucronate, upper side glaucous and velvety, under villous: racemes terminal, crowded.—*W. and A. Prod. p.* 179.

This is an abundant and very handsome shrub in flower at all seasons. It is met with in every wood and also in the hedge rows and thickets about the houses. It is an erect growing ramous plant rising to the height of from 8 to 12 feet, particularly conspicuous by its numerous long erect racemes of pale purple flowers. The young branches, leaf—stalks and under surface of the leaves clothed with soft velvety pubiscence. Leaves unequally pinnate, leaflet about 12 pairs, ovate oblong, mucronate, glaucous above: racemes erect, many flowered, each flower furnished with a subulate bractea. Calyx tubular, obtusely 5 lobed, about half the length of the petals. Vexillum shorter than the wings, emarginate, retuse. Legumes tomentose moniliform. Seed oval polished hard, radicle inferior nearly straight.

This very ornamental shrub merits a place in every garden and shrubbery as with a little care in pruning it might be much improved in appearance.

CROTALARIA.

Calyx 5-lobed, somewhat 2-lipped; the upper lip 2-, the lower 3-cleft. Corolla: vexillum large, cordate, with scales or callosities at the base: keel falcate, usually tapering to a point, more rarely obtuse. Filaments all united; sheath usually cleft in its upper part. Legumes turgid: valves ventricose, inflated. Seeds compressed, reniform, usually several.—Herbaceous or shrubby plants. Stipules and bracteas sometimes minute or wanting, sometimes large. Leaves simple or palmately compound, with 3-5-7 leaflets. Flowers usually yellow.—*W. and A. Prod. p.* 180.

This is a most extensive genus, in the papilionaceous tribe second only to Astragalus in the number of its species which now amount to about 250. They are generally large flowered showy plants, with very few exceptions, of tropical or subtropical origin and for the most part natives of Asia and America. In habit they are shrubby or herbaceous many of the latter very small. Though the species are thus numerous, yet they are upon the whole of easy discrimination owing to the numerous well marked groups into which they can be classed. Very few of the species are in an economical point of view useful to man. The genus being principally of tropical origin but few are found on the Hills, but those that do occur are usually among the most handsome that are met with in this part of India.

CROTALARIA BARBATA (Graham:) herbaceous, erect, densely clothed with dark brown hairs: stipules minute, inconspicuous: leaves oblong-lanceolate, bluntish; racemes terminal, elongated: flowers few, distant: calyx a little shorter than the corolla, deeply 5-cleft, very hairy; segments slightly falcate: legume glabrous, stalked, 2-3 times the length of the calyx, obovoid: apex of the style and stigma woolly.—*W. and A. Prod. p.* 181.

This fine species is not uncommon in the woods about Ootacamund in moist soil near streams, &c. It attains a considerable size and is easily recognized by the unusual hairiness of all the young parts and its large conspicuous blossoms. When growing among bushes in favourable soil it sometimes attains the height of 10 or 12 feet but this is not common. It turns black in drying and in the herbarium is a course shaggy looking plant, a glance at the dissected seed fig. 10 will explain the nature of a curved radicle.

CROTALARIA FORMOSA (Graham!:) erect, branched, all over villous except the upper side of the leaves: stems terete: stipules minute, setaceous, reflexed: leaves cuneate, obovate, obtuse, glabrous on the upper side, villous beneath: bracteas lanceolate, acuminated, lower ones without flowers: flowers in a dense raceme at the extremities of the bracteated elongated branches: bracteoles setaceous, on the middle of the pedicels: calyx villous; legume oblong, broader upwards, glabrous, about 4 times the length of the calyx, many-seeded.—*W. and A. Prod. p.* 186.

This species is met with most in pasture grounds on the sides of the higher hills. It is very abundant along the Kaity road flowering in great perfection in February and March but is not confined to these months. It is well named "*formosa*" being indeed a beautiful species. It is a small erect shrubby plant from a foot and half to two feet high but in very favourable situations occasionally as high as 5 feet each branch terminated as here shown, by a rich compact cluster of pale yellow flowers streaked with brown. The upper surface of the leaves is of a deep pea green the under whitish from a dense covering of white hairs.

CROTALARIA WALLICHIANA (W. and A.:) herbaceous, erect, much branched, young branches irre-

gularly and rather bluntly angled, with the racemes and under side of the leaves densely pubescent: stipules lunate, transverse, recurved: leaves oval, glabrous above, marked beneath with rather prominent nerves: racemes terminal and leaf-opposed, many-flowered: bracteas subulate, reflexed, small: pedicels elongated, longer than the calyx: bracteoles very minute, setaceous, about the middle of the pedicel: calyx smaller than the corolla, densely pubescent; legume clavate-oblong, stalked, softly pubescent, many-seeded.—*W. and A. Prod. p.* 187.

This species abounds in the woods and thickets of Ootacamund but is by no means confined to them. It prefers rich moist soil and seeks support from the surrounding trees and bushes. In such situations it is no uncommon occurrence to see it attain the height of from 10 to 15 feet. It is in flower at all seasons quite enlivening the thickets among which it grows with the number and brilliancy of its blossoms. In its characters and general appearance it approaches, perhaps, too nearly to *C. semperflorens,* from which it appears hardly distinct.

INDIGOFERA—INDIGO FAMILY.

Calyx 5-cleft; segments acute. Vexillum roundish, emarginate: keel furnished with a subulate spur on both sides, at length often bending back elastically. Stamens diadelphous (9 and 1). Style filiform, glabrous. Legume continuous, one or more seeded, 2-valved. Seeds usually truncated, separated by cellular spurious partitions.—Herbaceous or shrubby. Stipules small, free from the petiole. Peduncles axillary. Flowers racemose, purple, blue, or white; many of the upper ones of each raceme frequently becoming abortive. Leaves various, usually unequally pinnated or digitate: hairs, either all or some of them, adpressed and attached by their middle.—*W. and A. Prod. p.* 198.

This, like the preceding, is a numerous and polymorphous, but, upon the whole, natural genus, though characterized by a single point of structure, the peculiar spur on the keel petals, well shown in the dissected flower of *I. pedicellata.* They are further distinguished by a peculiarity of their hairs which is, I believe about equally invariable throughout the genus, that, namely, of being attached by the middle and having two free ends in place of one, the usual form. This peculiarity however is not limited to this genus.

The genus includes about 200 species, some of them large shrubs, as for example *I. pulchella* and many minute herbs almost inconspicuous when nestling among the grass where they grow. Many of them have little short or round pods with one or two seeds, while others again have as many as twenty. The *Indigoferæ* are mostly of tropical or subtropical origin, hence very few are found on the more elevated ranges on these hills, though lower down they are sufficiently numerous.

Indigofera pulchella (W. and A. Prod.) large erect shrub or small tree, young parts usually whitish with short adpressed hairs; branches angled: leaves pinnated; leaflets 8-10 pairs, obovate or broad elliptic, emarginate, mucronate; racemes about the length of the leaves, sessile, many-flowered, springing from the axils of the leaves and from the former years' leafless branches: flowers large, at first crowded, afterwards more distant: calyx-segments short and acute; petals many times longer than the calyx, patulus and resembling a bilabiate corolla: legumes scattered along the rachis, slightly deflexed, nearly cylindrical, thick, straight, sharp-pointed, 10-12 seeded; sutures callous, thick.—*W. and A. prod. p.* 203.

This very beautiful species abounds about Coonoor quite ornamenting the brush wood by the road side for nearly two miles on either side of that place. Judging from a specimen so named in my collection with which I have compared it, this plant seems nearly if not quite identical with Roxburgh's *I. elliptica* but does not differ sufficiently from his *pulchella* to admit of my considering it distinct. About Coonoor it is a shrub, varying from four to as many as 8 feet in height and when in full flower, which it is in February, is a beautiful object as the figure will show. It is to be met with in flower nearly all the year.

Indigofera pedicellata (W. & A.:) suffruticose, procumbent; branches filiform, sprinkled with short adpressed brownish hairs: older parts terete; young parts compressed, thickly covered with brown glands: leaves petioled, palmately trifoliate; leaflets cuneate oblong; both sides with short whitish hairs mixed on the under sides with glands: racemes almost sessile, somewhat corymbiform, about the length of the leaves: pedicels slender, drooping, 2-3, longer than the calyx: calyx deeply 7-cleft (segments linear and acute), and with the vexillum and keel hirsute and glanduliferous.—*W. and A. Prod. p.* 200.

This is one of the more minute procumbent forms. It is found in all the pastures about Ootacamund, spreading on all sides among the grass, but only rendered conspicuous by its clusters of bright crimson flowers which raise themselves above the herbage which usually conceals the rest of the plant.

Rungiah del. Dumphy, lith.

Indigofera pulchella

Rungiah del *Dumphy Lith.*

Indigofera pedicellata.

Rungiah, del. Dumphy, Lith.

Desmodium rufescens (D.C.)

Rungiah del. Dumphy Lith.

Desmodium strangulatum (W. & A.)

DESMODIUM.

Calyx with two usually caducous bracteoles at its base, cleft to the middle into two lips; upper lip 2-cleft; lower 3-partite. Corolla papilionaceous, inserted into the base of the calyx: vexillum roundish: keel obtuse, but not truncated. Stamens diadelphous (9 and 1), or monadelphous from the base to the middle and usually diadelphous upwards: filaments somewhat persistent. Ovary with several ovules. Style filiform. Stigma capitate. Legume compressed, composed of several joints: joints 1-seeded, separating at maturity.—Herbaceous or suffrutescent plants or small trees. Leaves either pinnately trifoliolate, or simple by the abortion of the lateral leaflets. Partial stipules 2 at the base of the terminal leaflet, solitary at the base of the lateral ones. Flowers usually racemose, sometimes umbelled, sometimes on simple peduncles, axillary or more usually terminal. Flowers purplish, blue, or white.—*W. and A. Prod. p.* 223.

This, like both the preceding, is a genus abounding in species inhabiting the tropics and warmer parts of Asia, Africa, America and Australia. The number of its species, already described, exceeds 150 and are as varied in the forms they present as those of either of the preceding. They, in common with the rest of the tribe, are distinguished by their peculiar jointed legume or *lomentum*, as that kind of pod is designated. They are herbaceous or shrubby in their habit and are very variable in their forms and the situations in which they are found, but notwithstanding this tendency to assume different forms, the genus seems upon the whole a natural one, as it has scarcely undergone, in the hands of subsequent writers, any alterations since its first publication in DeCandolle's Prodromus, though in the mean time half as many more species have been added to it as he described. It is principally of tropical origin and, though there are about 20 Peninsular species, only two or three are found on the hills, and these not on the higher levels. Neither of the two here delineated are found so high as Ootacamund but both occur at Coonoor and *D. strangulatum* in woods about Pycarah and elsewhere about the same level.

Desmodium rufescens (DC.:) shrubby: branches, racemes, bracteas, pedicels, stipules, petioles, and nerves of the leaves beneath, densely clothed with yellowish-brown tomentum: leaves trifoliolate; leaflets oval, obtuse with a long bristle; upper side glabrous; under densely clothed except the nerves with adpressed silky white hairs, especially when young: stipules caducous: racemes axillary and terminal, many flowered: bracteas ovate, tapering to a long subulate point, before expansion densely imbricated, soon caducous: vexillum large, obcordate: alæ as long as the broad keel: legume pubescent, about 7-jointed, straight on the one suture, notched into the middle on the other.—*W. and A. Prod. p.* 228.

This is about the handsomest of the Indian species. It is a low shrub between two and three feet high, growing in moist soil among brushwood and by roadsides.

The specimen delineated was gathered on the roadside a little below Coonoor. It is generally to be met with in flower but in greatest perfection during the rainy season. It is a subalpine species rarely met with on the plains though I have very frequently found it in alpine jungles both on the continent and in Ceylon.

Desmodium strangulatum (W. and A.) herbaceous, erect?: branches hairy, somewhat 3-angled, angles obtuse: leaves 3-foliolate, long petioled: leaflets pubescent on both sides, lateral ones obliquely ovate, terminal one rhomboid: stipules scariose, oblong-lanceolate, concave, glabrous: racemes hairy, axillary and terminal, panicled, at first oblong and imbricated with large oblong concave hairy bracteas, afterwards becoming very long and lax, few-flowered: flowers 2-3 together, on long filiform pedicels: calyx campanulate, bilabiate; upper lip emarginate, under deeply cleft: vexillum obovate; alæ shorter than the keel: stamens monadelphous from the base to the middle, diadelphous towards the apex: ovary stipitate, about 4-ovuled: legume 2-3 jointed (occasionally from abortion 1 jointed), much contracted on one suture between the joints, even on the other, hispidly pubescent; joints semi-oblong, nearly equal on both ends. —*W. and A. Prod. p.* 228.

A slender, erect growing, herbaceous plant a native of shady woods in moist rich soil. The very unusual colour of its flowers, deep orange, renders it a conspicuous object in such situations. That, combined with the deep divisions of its pod, readily distinguishes it from the rest of the genus.

SMITHIA.

Calyx scariose, with two bracteoles at its base, bipartite: segments entire or slightly cleft. Corolla papilionaceous, inserted into the bottom of the calyx: keel cleft from the base to near the apex. Stamens 10, equally monadelphous (5 and 5). Legume 4-6-jointed, folded up within the calyx, very much contracted between the joints: joints 1-seeded, orbicular: sinus rounded.—Procumbent herbaceous plants with abruptly pinnated

leaves. Leaflets few, ciliated with adpressed bristles. Stipules semisagittate. Racemes axillary, few-flowered. Corolla yellow.—*W. and A. Prod. p.* 220.

This is a small genus but as regards the discrimination of the species a most difficult one. There were originally but two species, the number has been since much increased and must, I believe, from among the various forms met with on the Hills be still further augmented by probably as many as two or three species. This however is a point not easily determined, for I think I have never met with a genus in which it is so difficult to find characters by which to discriminate the species, even in cases where to all appearance they are quite distinct. Indeed in the present instance I feel almost quite certain that the elements of two species are to be found in the accompanying plate. The figure of the plant and dissections of the flower are taken from one specimen, and the figure showing the pod from another. The calyx which accompanies the pod is glandular and hairy within, that belonging to the specimen delineated is glabrous and eglandular, but the plants seemed the same. There are only six known and distinguished species of this genus, 5 of which are Indian and four of these I suspect natives of the Hills, namely, S. *sensitiva, racemosa, blanda,* and *paniculata.* Through the kindness of Mr. Law of Bombay I have other two, namely S. *geminiflora*? remarkable for bearing purple flowers and a new species which I propose dedicating to the discoverer.

Smithia blanda (Wall) suffruticose, diffuse, every where, except the upper surface of the leaves and corolla, hairy: leaves abruptly pinnate 3 paired; leaflets linear, elliptic, obtuse, mucronate; glabrous above, hairy beneath: racemes, axillary and terminal: flowers congested towards the apex: calyx 2-lipped, upper lip bifid, under 3-cleft; without pellucid glands or dots. R. W. MSS.

Pycarah in moist swampy soil flowering in July. A low growing diffuse plant, leaves abruptly pinnate, 3-paired: leaflets about half an inch long and half as broad, linear elliptic, rounded at the apex, mucronate, under surface hairy, glabrous above, flowers yellow.

In the accompanying figures, No. 3 showing a magnified view of the bracts, calyx and stamens, is from a flower picked from the specimen represented. No. 6 showing the calyx and pod belongs to apparently another species, and is introduced partly to show the form of the pod of the genus, partly to indicate a specific distinction, the one being perforated with transparent glands which are wanting in the other. The glandular one is probably *S. racemosa* but of this I am uncertain, as I have not authentic specimens of either it or of *S. blanda* for examination, and the character under consideration is not indicated in the published definition of either species.

FLEMINGIA.

Calyx ebracteolate at the base, acutely 5-cleft; the four upper segments about equal, the lower one usually much longer. Corolla papilionaceous: vexillum without callosities; the spurs inflexed at the margin: keel falcate. Stamens diadelphous (9 and 1). Ovary 2-ovuled. Style glabrous. Legume sessile, oval, turgid, 2-seeded, without a partition between the seeds. Seeds nearly globose; hilum small; caruncul us inconspicuous or wanting.—Shrubby or suffrutescent. Stipules scariose, lanceolate; sometimes very large, usually deciduous. Leaves petioled, digitately trifoliolate or simple: under side usually dotted with small glands; the nerves prominent, parallel, long and simple. Partial stipules wanting. Racemes axillary, solitary or aggregate, sometimes panicled. Flowers several together. Legumes more or less pubescent.—*W. and A. Prod. p.* 241.

This genus, founded by Roxburgh in honor of his friend Dr. Fleming is pre-eminently an Indian one, none of its species having, so far as I am aware, been found except in India and the countries adjoining. I have specimens of some of its species from Maulmain and Ceylon, but it seems not improbable they extend to Malacca and far Eastward. All the species except the one here represented are erect growing plants usually with long erect racemes of flowers. The one figured differs, therefore, so widely in habit from the rest of the species, that I had some difficulty in persuading myself that it really belonged to the genus.

Owing, apparently, to some of the species having at first been referred to the genus *Hedyserum,* DeCandolle placed it in his tribe *Hedysareæ* to which it clearly does not belong. It is now, though somewhat at variance with its usual twining habit, referred to the tribe *Phaseoleæ.* Several species besides the present are natives of the Hills, especially towards the Koonda range.

Flemingia procumbens (R. W.) herbaceous, diffuse, procumbent, hairy: leaves palmately trifoliolate; middle leaflet obovate, lateral ones ovate, slightly unequal at the base, hairy above, nearly glabrous, except the veins, beneath: peduncles longer than the leaves: flowers capitate: calyx deeply 5-cleft, divisions linear, lanceolate, acute, about the length of the corolla: ovary 2-seeded: stigma capitate hairy: legume shorter than

Rungiah, del. Dumphy, Lith.

Smithia blanda

Rungiah, del. Dunphy, Lith.

Flemingia procumbens (R. W.)

the calyx usually, by abortion, one-seeded: seed oval.

Pycarah in pastures, frequent. A very diffuse plant lying flat on the ground and spreading all round, extending from 12 to 18 inches from the root, leaves about an inch long and 8 lines broad, under the surface sprinkled with minute garnet coloured glandular points, flowers dark dull purple.

XXVII.—ROSACEÆ—ROSE TRIBE.

This in comparison with the preceding is a small family but contributes fully as much, or perhaps more, to the luxuries of life, though less to the wants of mankind than its more bulky neighbour. To this we are indebted for a large proportion of the finest European fruits such as apples, pears, quinces, medlars, cherries, plums, peaches, nectarines, apricots, strawberries, raspberries, and blackberries, and many more of inferior note. Here also we find as ornaments the charming rose, the fragrant May, the elegant Service and Mountain Ash trees while our flower borders are ornamented with the varied Potentillas, Dryases, Meadowsweets &c. In this again we have one of the most curious anomalies to be met with in the vegetable kingdom an extensive family in which there is not a poisonous fruit, yet yielding to the Chemist the most intensely active and deleterious agent to animal life yet known in nature, namely, the Prussic acid so abundantly produced by the leaves of the cherry-laurel, peach, almond, &c. trees.

The fact just mentioned, of its producing no poisonous fruit, is interesting, especially to travellers, since any one may with perfect confidence eat the fruit of any Rosaceous plant he happens to encounter though he has never seen it before.

In their geographical distribution are *Rosaceæ* peculiarly extra-tropical a very few only being found within the tropics and these at considerable elevations. Of the small number, about 15 species recorded as natives of the Indian Peninsula 11 perhaps 12 are found on these Hills, while there is not one to be met with on the plains except the Loquat, an introduced tree which rarely if ever bears fruit near the level of the sea, but does so abundantly at Bangalore, 3,500 feet above it.

In its Botanical relations this family is to the full as intricate as *Leguminoseæ* but like it, all its various forms are linked together by one constant character, the posterior position of the odd sepal of the calyx. It is always next to the axis, however different or unlike the plants may be in all other respects.

To facilitate the discrimination of its species, which are often very dissimilar, they like *Leguminoseæ* have been grooped into suborders, in which the genera that most nearly associate are brought together. These groops or suborders are—1st. *Dryadeæ* including the potentillas, strawberries, raspberries, &c. 2d, *Roseæ* including the true roses. 3d, *Pomeæ* including apples, pears, medlars, hawthorn, &c. 4th, *Amygdaleæ* including plums, peaches, cherries, &c.; and 5th, *Sanguisorbeæ* a suborder that might with advantage be removed to another division of the system as a distinct order.

This enumeration of the parts of which the whole is composed will show how complex that whole must be and the deep knowledge of vegetable structure, in connection with vege-

table relationships, that must have been required to trace the affinities by which they are united. Who, for example, except a most profound and philosophical investigator of vegetable structure could have traced any relationship between a rose and a strawberry, or between a raspberry and a peach, or not less extraordinary, between an apple and a cherry, or many other still more, apparently, irreconcileable contrasts that might be adduced.

Incongruous as such associations may appear they have all been most distinctly made out and are now considered in Botany as well established facts as that two and two make four. To explain how these relationships are proved is not an easy matter since to trace them requires, at starting, a considerable knowledge of structure in its most primary forms. Attention however to the following easily observed points will tend to show that the demonstration is quite possible.

The general character of the whole order is to have 5 sepals, two pairs and an odd one, the odd one being always posterior or next the axis while the odd petal stands opposite it on the other side of the flower. The stamens and petals in all are perigynous that is inserted on the disk of the calyx at some distance from the ovary (see all the accompanying figures) and with one exception, the seed in all are without albumen, to these may be added that the stamens generally exceed twelve and are often very numerous and the ovules, except in Pomeæ, pendulous. In addition to these points of agreement the rose and strawberry agree in having numerous one seeded carpels with the seed suspended from the apex of the cell, and in their style rising from the side not the apex of the carpel.

But the rose differs in having its carpels inferior enclosed within the tube of the calyx, or rather, it may be called, a hollow receptacle formed of the dilated apex of the peduncle: while the Strawberry has its carpels superior attached to a spongy receptacle, which swells and becomes sweet and succulent as the fruit attains maturity, in depressions of the surface of which its little nuts nestle. Thus the fruitification is the same in both, all except the receptacle, which is a hollow concave cell in the one, a projecting convex spongy body in the other. This one difference great as it is, is not considered of sufficient importance to constitute them distinct orders. *Potentilla* only differs from the strawberry in the structure of its receptacle: in Potentilla it is elevated but dry and at maturity does not like the strawberry come away with the seed or nuts but remains attached to the calyx. The Raspberry and Bramble differs from both, in the fruit the receptacle of which is dry and elevated as in the Potentillas, but the carpels, in place of being little dry nuts, as in them, are miniature drupes or stone front, that is, each seed or stone is enclosed in a succulent pulpy covering the same as the stone of a cherry or plum. Here then is the first decided gradation between the *Potentilleæ* and *Amygdaleæ* tribes, the difference between them being that in Raspberries &c. there are a congeries of miniature drupes spread over a superior receptacle and a persistent calyx; while in Cherries &c. there is only one carpel, in the middle of the flower, and the calyx is deciduous. These differences are esteemed of less value than the others by which the two tribes are connected, hence the *Amygdaleæ* are considered merely a suborder of the family of *Rosaceæ*, the more so, as in this tribe we find non-succulent fruit the same as in the other, as for example *Pygeum* (No. 59) which has neither a stone nor pulpy covering for its seed, but is yet considered a truly amygdaleous tree.

Having thus shown how nearly *Roseæ* and *Potentilleæ* associate and how brambles and raspberries pass into cherries and plums it now only remains for me to endeavour to trace the connection between these and *Pomeæ* or apples, pears, hawthorns, &c. In this tribe the calyx corolla and stamens are the same as in the others, except that the calyx is tubular at the base and more or less perfectly encloses the carpels or ovaries. These vary from two to five having two erect, not pendulous (as in the other) ovules in each, and as the fruit advances to maturity the calyx and outer coat of the carpel increases in size and thickness until in course of time it becomes an apple inclosing the carpels which in most of them, are not hard and bony as in the drupe. Here are striking points of difference: but to set against them we have the inferior fruit of the rose: we have the enlarging receptacle of the strawberry, the thickening of the outer coat of the seed vessel of the plum, peach, &c., and we have the bony seed of the hawthorn, one of the pomeæ, and the want of it in Pygeum one of the amygdaleæ. The difference therefore is reduced to the erect ovules and the seed vessels being enclosed in the enlarged and prolonged calyx, to which in this family only a subordinate value is assigned; and this also is therefore reduced to the rank of a suborder thought at first sight so very unlike all the others.

It must be acknowledged that it is no easy matter to construct a general character caculated to include the whole but still it has been accomplished. Endlicher however, the last writer on the subject, has preferred raising Amygdaleæ and Pomaceæ to the rank of distinct orders in which I am disposed to go along with him at least as regards the latter as tending to render our characters less prolix while they more clearly define the limits of our orders. I particularly mention Pomeæ, because I think sufficient importance has not in this case been attached to the difference of position of the ovule which, added to the difference of habit properties and relative position of the carpel and calyx, form a combination of characters, in my opinion, quite sufficient for the purpose; the essential difference depending on the direction of the ovule. Ovules pendulous seed inverted would then form the essential distinction of *Rosaceæ*—While ovules erect seed ascending would, combined with the other characters of Rosaceæ, characterize *Pomeæ.*

I have dilated on the interesting peculiarities of these two remarkable families as affording such numerous and striking, but upon the whole, easily explained, examples of fruits most dissimilar in appearance but which, when properly analysed and traced back to their origin, can easily be shown to be in their elementary structure nearly the same and owing their differences at maturity to adventitious circumstances often the creatures of art not of nature. Who from looking at a luscious peach or plum, and a scraggy bean or pea pod, could ever suspect that in their earlier stages they were all structurally alike, or who untaught, could imagine the parts of a raspberry and a cherry so exactly alike that the former is, as it were, but a heap of miniature cherries sticking together. Such analytical investigations of structure through all its stages, *ab ovo usque ad mala*, constitutes the Philosophy of Botany, and forms the foundation on which the beautiful super-structure of the Natural classification of plants, is built.

FRAGARIA—STRAWBERRY.

Calyx concave at the bottom, 5-cleft, with 5 bracteoles. Petals 5. Stamens numerous. Achenia juiceless, scattered on a fleshy and succulent deciduous polyphore or receptacle. Style lateral. Seed suspended.—Herbaceous plants throwing out runners. Leaves trifoliolate : leaflets coarsely toothed. Receptacles or polyphores roundish, succulent, red or whitish.

This genus though the number of species is inconsiderable has a wide geographical range : Europe : North and South America beyond the tropics : and Nepaul, Neilgherries, Java, China, and, I think, Ceylon in Asia : but in all tropical Asiatic stations at considerable elevations. Two species are found on the Neilgherries, a large proportion (⅓) of the whole recorded species. The one *F. elatior* is also found in Europe, America and China, the only station assigned for the other was Nepaul until discovered here.

Several species are more or less extensively cultivated for their fruit, but the *F. Vesca* and its varieties by far the most extensively. To offer any remark on the excellence of this fruit would be waste of time, as who requires information on that point ? but as regards its cultivation on the Hills, a passing remark may be made—which is, that those desirous of enjoying this fruit in something approaching to European perfection, must plant it afresh every year. Those produced from two year old plants I have almost invariably observed, are sparing in quantity and indifferent in quality, unless perhaps in those rare instances where they find a very congenial soil and exposure. When growing in low situations and annually exposed to frost in sufficient intensity to destroy the foliage, as in Europe, the case may be different, but generally the rule is to take one crop, which lasts about six months, and then plant afresh.

Fragaria elatior (Ehrh.) leaflets somewhat coriaceous : hairs on the petioles, peduncles, pedicels and calyx widely spreading : calyx in fruit reflexed : bracteoles similar to the calycine segments.—*W. and A. Prod. p.* 300. *Fragaria Nilagirica.* (Zenker.)

Very common about Ootacamund, to be met with in flower and fruit all the year, but the latter most abundant in May, June and July. The flower and fruit white, the latter, with occasionally a pale rose blush on the side exposed to the sun. It has little flavour, but a sweetish watery taste. Eaten with the addition of lime juice and sugar, it is admired by some.

Fragaria Indica (Andrews) leaflets obovate ; peduncles axillary, solitary, 1-flowered : bracteoles patulous, cuneate, much larger and broader than the entire calycine segments, deeply 3-5-toothed at the apex.—*W. and A. Prod. p.* 300.

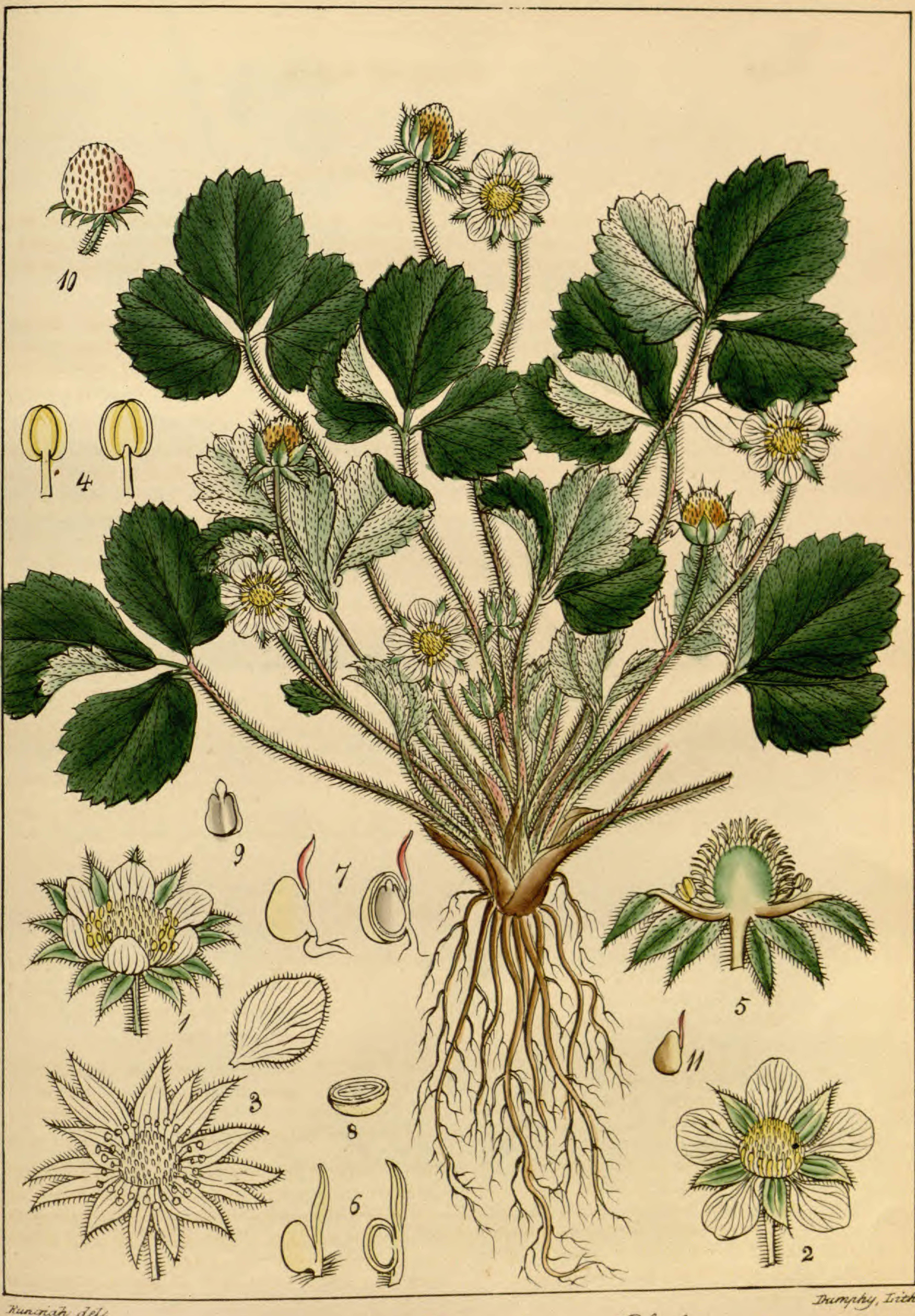
Frequent in shady woods where the soil is somewhat moist. Unlike the rest of the genus, the flowers are yellow. The fruit is a bright red, very tempting to the eye, but watery, mawkish and disagreeable to the taste.

POTENTILLA.

Calyx concave at the bottom, 4-5-cleft, with 4-5-bracteoles. Petals 4-5. Stamens numerous. Achenia numerous, collected into a head on the flattish persistent dry receptacle. Style lateral. Seeds suspended.—Herbaceous or suffrutescent plants. Leaves compound. Stipules adnate to the petiole. Flowers white or yellow, rarely red.—*W. and A. Prod. p.* 300.

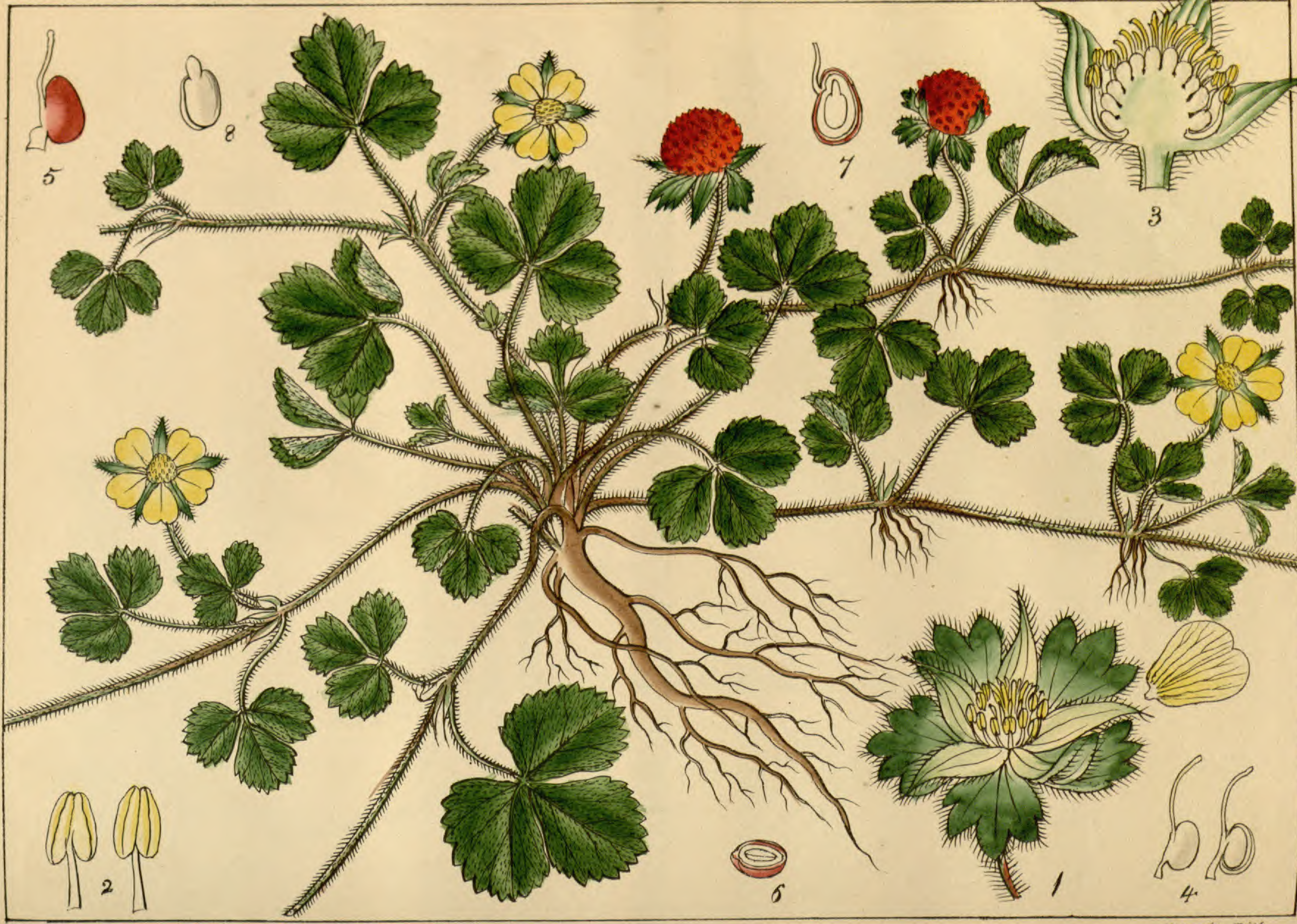
This genus is one of great extent, including nearly if not fully, 200 species, but of that vast number few only are found within the tropics, none so far as is yet known, on the plains of India. Two only occur on the Hills, one of these, (No. 63) is very common, the other though much less so, not actually rare, but, from being a marsh plant, less seen owing to its being liable to be hid among the rank vegetation.

It is a genus so very nearly allied to the strawberry, that one of its species was long confounded with it, under the name of *Fragaria sterilis*, in allusion to its not producing any fruit resembling a strawberry, which as being a true Potentilla it could not do ; the distinction between the two genera as already mentioned, resting on the one, strawberry, having a large spongy succulent receptacle for the seed, while that of the other is dry. Many of the species of this genus are cultivated as garden ornaments, and two or three introduced into England from Nepaul, are indeed very ornamental : among these may be mentioned *P. atro-sanguinea, Nepalensis*



Rungiah, del. Dumphy, Lith.

Fragaria elatior (Ehrh)



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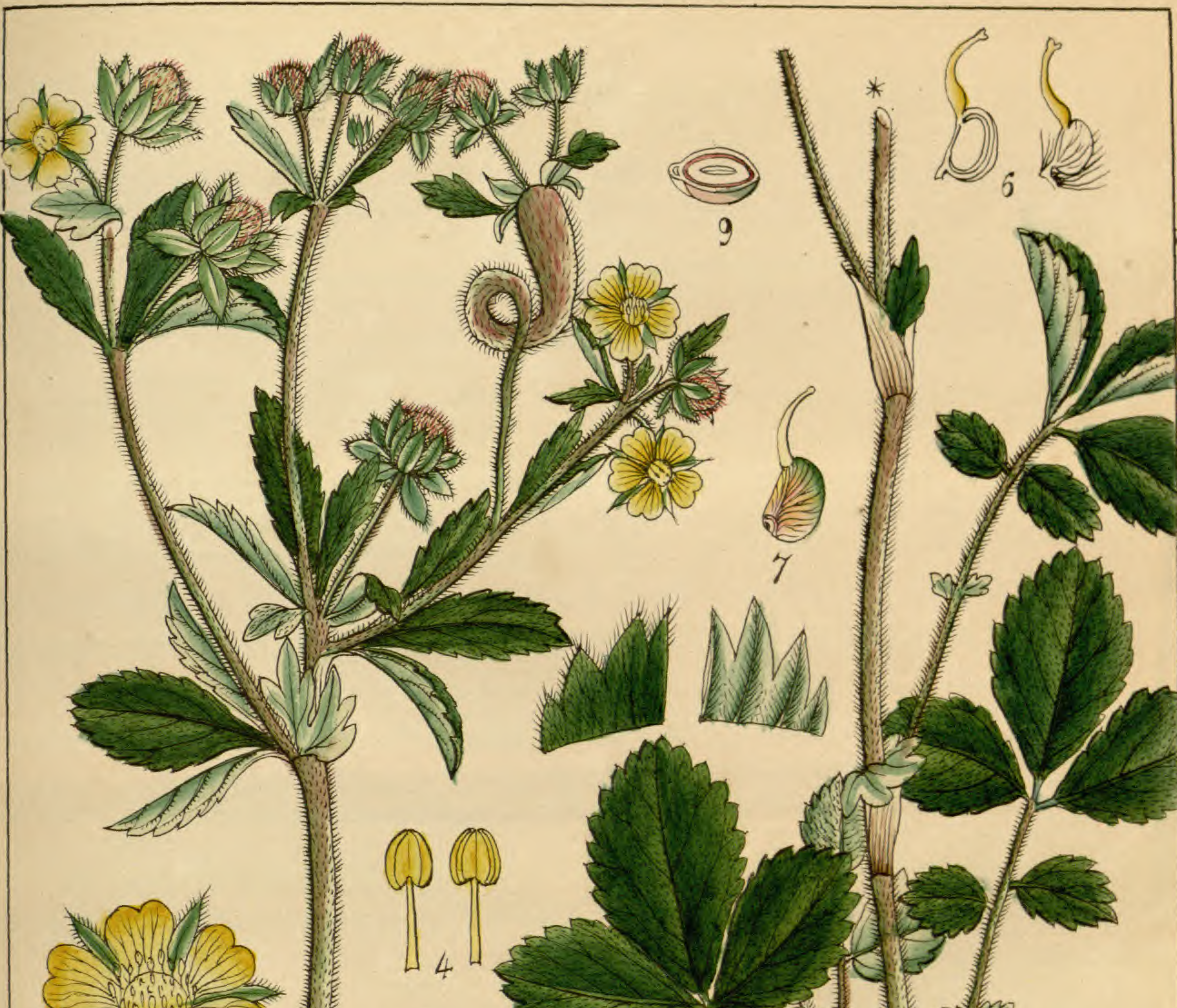
Fragaria indica (Andr)



Rungiah, del. Dumphy, lith.

Potentilla Leschenaultiana (Ser)

Rungiah, del. Dumphy, lith.

Photenia Notoniana

Rungiah, del. Dumphy Lith

Cotoniaster buxiflius (Wall)

and *splendens*. Many others are in cultivation, but these are the principal Indian ones that have found their way to Europe.

Potentilla Leschenaultiana (Ser. :) covered all over with silky long hairs : stems decumbent at the base : radical and lower leaves pinnated, longish petioled ; leaflets 5, cuneate-obovate, obtuse, incise-toothed, the lower pair smaller than the others : upper stem leaves palmately 3-5 foliolate ; leaflets about equal and similar to the larger leaflets of the radicle leaves : stipules large, ovate-lanceolate; lower ones often entire; upper toothed or deeply cut : flowers in terminal forked panicles, or corymbose : calycine segments and bracteoles about equal, oblong-lanceolate, more or less obtuse : petals (yellow) slightly obcordate, about equal to the calyx : receptacle villous : carpels slightly wrinkled.—*a ;* stems short ; panicles small, corymbiform.—*W. and A. Prod. p.* 301.

This is a very common plant, being found almost on every road or ditch side, as well as spreading among the grass on all sides. It is often, or rather is generally procumbent, but also occurs as here represented, erect. The fruit in this species approaches more nearly to that of the strawberry, than is common in the genus, owing to the large size and spongy texture of the receptacle, but still it is a true potentilla.

PHOTINIA.

Calyx 5-toothed. Petals reflexed. Ovary half-adhering, villous, 2-celled, 4-ovuled. Styles 2, glabrous. Pericarp bilocular (rarely from abortion unilocular and 1-seeded), inclosed within the fleshy calyx. Testa of the seeds cartilaginous.—Trees. Leaves simple, coriaceous, evergreen. Panicles corymbose, terminal. Fruit small.—*W. and A. Prod. p.* 302.

This genus includes 12 recorded species, but some of these doubtful, two of the 12 are natives of the Neilgherries, both common, both beautifully flowering trees, and the fruit of both about the size of peas, and possessing the taste of the fruit of the mountain Ash so exactly, that any one on tasting them would at once pronounce them the fruit of that tree. Between the two genera *Photinia* and *Pyrus*, the difference seems slight, if indeed a truly essential difference exists. In Pyrus the ovary is usually 5 or 3 celled, and here it is two, but two also occurs in Pyrus. Exclusive of this, the other points of distinction mentioned in the characters of the two, seem differences but not distinctions, as they are not of a nature to be permanent in a number of species. The essential character of this is styles 2, ovary 2 celled, while that of Pyrus is, styles 5 or 3-ovary 5-3 celled. In this tribe as already mentioned, the ovules are erect, the seed ascending, and the radicle inferior. In the plate the draftsman has reversed the position of the seed and represented the radicle superior, a blunder which trusting to his general accuracy, I did not detect until I came to examine the character of the tribe, with a view to the preparation of these notes.

Photinia Notoniana (Wall. ?) leaves from cuneate-lanceolate to oblong, acute, quite entire or with a few inconspicuous scattered teeth : panicles large, very compound ; ramifications puberulous : pedicels much shorter than the calyx : cells of the ovary spuriously semi-bilocular : fruit glabrous, 2-seeded.—*W. and A. Prod. p.* 302.

This is a considerable tree, abundantly distributed over the Hills. It flowers during March and April, and when in full flower is a beautiful object, each branch being terminated as here shown, by a large cluster of white, tending to rose coloured, flowers. In June the fruit ripen and then are of a dull redish brown colour. Seeds usually four, each enclosed in its own proper cell ascending enclosed in the succulent calyx, radicle inferior. The fruit possess in a remarkable degree the peculiar sour, austere taste of those of the mountain Ash.

Figures 8, 9, 10 and 11 of this plate are all inverted. The radicle should in all have been inferior, not superior, as shown in the plate.

COTONEASTER.

Flowers often polygamous : calyx turbinate obtusely five toothed : petals short erect : stamens about the length of the teeth of the calyx, styles glabrous, shorter than the stamens carpels 2-3-partially, enclosed in the calyx 2-ovuled. Shrubs with simple entire leaves wholly beneath : corymbs lateral patent, furnished with deciduous subulate bracts : petals small persistent.—*D. C. Prod.* 2—632.

Cotoneaster buxifolla (Wall. List) shrubby erect, very ramous : leaves oval or subobovate, pointed, glabrous above, tomentose beneath : corymbs few flowered : peduncles and calyx tomentose.

A small erect densely ramous scraggy looking shrub, rather frequent about Ootacamund, also on the road-sides to Kotagherry and Kulhutty, flowering March and April—also very abundant in Orange valley, where I found it in flower in August and September. It rarely attains the height of six feet, is full of little branches forming a dense compact mass of vegetation. The leaves are small, rarely attaining the length of ½ an inch, and little more than half the breadth, glabrous above, clothed beneath with soft white hair; usually oval or tending to obovate, attenuated below, mucronate at the point. Flowers small, white, in little clusters of three or four : calyx tomentose : petals round glabrous withering before they fall : ovary of two carpels hairy, at first scarcely immersed in the calyx ; calyx afterwards enlarging and enclosing them. Fruit about the size of a pea, succulent, with a harsh austere taste : seed four, ascending testa bony radicle inferior.

This differs from *C. affinis* to which D. C. referred doubtfully to it, in its erect not procumbent habit, smaller leaves and fewer flowered corymbs.

PYGEUM.

Tube of the calyx cup shaped limb 6-cleft : corolla 6-petaled inserted on the throat of the calyx : stamens 12-13 inserted with the petals ; filaments filiform ; anthers 2-celled deluscing longitudinally : ovary sessile 1-celled ; ovules 2-collateral, pendulous ; style terminal stigma dilated : drupe dry transversely oblong subriniform contracted in the middle, one-seeded : seed inverse exalbuminous cotyledous, very thick, radicle very short, superior. Trees with alternate oblong entire leaves often with 2 glands at the base, racemes axillary and lateral, solitary or several, often tomentose, flowers small 1 bractiate. *Endl. gen. plant.*

Pygeum acuminatum ? (Colebr.) "a tree with alternate oblong, acuminate entire, glabrous leaves : racemes axillary : flowers yellowish."—*Polyodontia arborea Blume.*

The specimens from which the drawing was made, were gathered at Kaitee falls in July. I since, in company with Mr. Gardner of Ceylon, found it in great abundance near the Avalanche in fruit, in February. It is a large tree producing a fine spreading umbrageous head, with large ovate acuminate entire glabrous leaves, without glands : solitary glabrous, racemes and slightly hairy calyx tube : ovary hairy with glabrous style and 2-lobed dilated stigma.

The above character is so brief and general that it is impossible to say whether this is Colebrooke's plant, but as it agrees, so far as it goes, I have adopted his name, with a doubt, having nothing further to guide me.

I am uncertain about the species, because it seems to me, had this been the one from which Colebrooke's character was taken, he would have described the flower as apetalous with a 12-lobed calyx limb. In this respect, if the dissection of my figure of *Polyodontia Ceylanica*, No. 256 is correct, and I believe it is, this can scarcely be considered a true congener, as it is represented with distinct calyx and petals, but I have not now the specimens to re-examine. Specimens of a Ceylon species which I have, correspond with this. Should this prove a distinct species, the following character might serve to distinguish it from the other species of the genus.

Arboreous : leaves alternate, oblong, acuminated, entire, glabrous : racemes axillary shorter than the leaves : flowers yellowish : calyx lobes and corolla indistinguishable, clothed with rusty coloured pubescence: filaments attached to the edge of the tube inflexed in æstivation : ovary ventricose, stigma dilated, two lipped, drupe dry friable, transversely oblong, glabrous.

This genus seems imperfectly known, it was first established by Mr. Colebrooke on an Indian plant. Blume afterwards found a species which he described under the name of *Polyodontia arborea*, which Walpers in his "Repertorium," has referred as a synonym to Colebrooke's plant, but I suspect erroneously, if this plant is correctly named. As regards the analysis of the accompanying figure, which was prepared in my absence, I have some misgivings as to its accuracy, a point on which I have not at present the means of satisfying myself.

XXVIII.—MILASTOMACEÆ.

This is a large, and for the most part, a Tropical family, the number of extra-tropical species being small when compared with the great number of equinoctial ones, and those found in the warm latitudes immediately adjoining. Many of the tropical species however possess the transition character assigned to Balsamineæ, that is, they are found in Alpine regions, and only make their appearance during the cool and rainy season of the year, or immediately after the rains are over. Such is the character of the Neilgherry ones, nearly all of which are in their greatest perfection in January and February.

By far the greatest number are natives of America, extending as far south as Brazil, in which country they are numerous. From that continent there are now nearly 1000

Rungiah del. Dumphy Lith.

Pygeum acuminatum? (Colebr.)

known species. Asia and her Islands, hold the next place, the number of species already derived from these regions amounting to about 200, a few only have as yet been obtained from the African continent, and still fewer from New Holland.

In Ceylon they are numerous in proportion to the extent of country where they principally occur, upwards of 20 species having already been obtained from the southern and more elevated districts of that country: that being the tract best examined. And there they are so numerous, that I have no doubt the number will, ere long, under the keen scrutiny of Mr. Gardner, be doubled. In India, so far as yet known, the number of species are, I suspect, fewer than in Ceylon; but the western ghauts where only they can be expected in any considerable number, have not yet been sufficiently examined during the most favourable seasons for finding them. In the plains of the Carnatic and Mysore, where the climate is dry, they are almost unknown, but about Courtallum where during the Southwest Monsoon, the climate is cool and moist, they are more frequent. On the more elevated Alpine regions such as the Pulney Mountains and the Neilgherries, they abound, though the number of species is small. The most productive tracts however of these hills are still imperfectly explored. On the western slopes where the climate is humid and apparently congenial to their constitution, I apprehend they will be found much more numerous than we are yet aware of. This I think from having lately found seven or eight species on the Sisparah Ghaut, about the end of February, the season being at that time so far advanced, that most of them were nearly past flower. Most of these are undescribed in our Prodromus.

When writing that work only 16 Peninsular species were known, these accessions raise the number to about 22, and among those obtained from other quarters now in my collection but not determined, it is probable three or four more may be added, making only 25 or 26, for the whole of the Indian Peninsula; a small proportion of the estimated number of Asiatic species. I have extended these remarks on the geographical distribution of this family, in the hope of their leading to future enquiries on the subject.

The family, as a whole is a very natural one, and marked throughout by so strong a family likeness, that two or three being known, the whole family may generally be recognized at first sight. This family likeness had led DeCandolle to remark of it, that "the family of *Melastomaceæ,* though composed entirely of exotic plants, and established at a period when but few species were known, is so well characterized that no one has ever thought of putting any part of it in any other group, or even introducing into it genera that do not rightly belong to it" (see Lindley's nat. system.) But it is not so easy to distinguish among themselves the genera and species of which it is composed, the closeness of their affinity often rendering this a very difficult process. The genera *Melastoma* and *Osbeckia* afford a striking example of this fact, the distinguishing character being derived from the anthers when in flower, and from the pulpy baccate fruit of the former when in fruit. The fruit of *Osbeckia* is a dry capsule. From both these and from the rest of the family, *Sonerilla* is at once distinguished by its ternary flowers, many of its species have moreover pinnately veined, not ribbed leaves, the latter being the predominant form in the order. This last indeed is one of its distinguishing features, and added to the long beaked anthers opening at the point by pores, leaves scarcely a doubt that any plant in which they meet, belongs to this family. They are further distinguished by the position of the anthers in æstivation, the apex of the filament being bent or folded down, and the anther lodged in a cavity

between the calyx tube and ovary. A nearly similar formation is found in *Memecyleæ*, which has induced both Meisner and Endlicher following Chamiesso, to unite these families, but to my mind injudiciously, as, so far as my acquaintance with them extends, I think they each form distinct and very natural groups, and that their union tends to spoil both. In habit they differ widely, also somewhat in the structure of the flower, by the complete union of the calyx and ovary, in the number and position of the ovules, which are very numerous in *Melastomaceæ*, but in *Memecyleæ* solitary and pendulous from the apex of the cells of the ovary: and lastly, the cotyledons of Memecyleæ are spirally convolate, which is wanting in the other. Each of these, as solitary characters, would be of little weight, but taken together, in my opinion, are more than sufficient to outweigh the solitary one derived from the incurved anthers in æstivation, by which alone the two families are sought to be united.

Regarding their properties, nothing of any importance is known—none are unwholesome, while the fruit of several are edible. Those of Melastoma being succulent and dark coloured, stain the mouth black in eating, whence the name which, literally interpreted means black-mouth.

SONERILA.

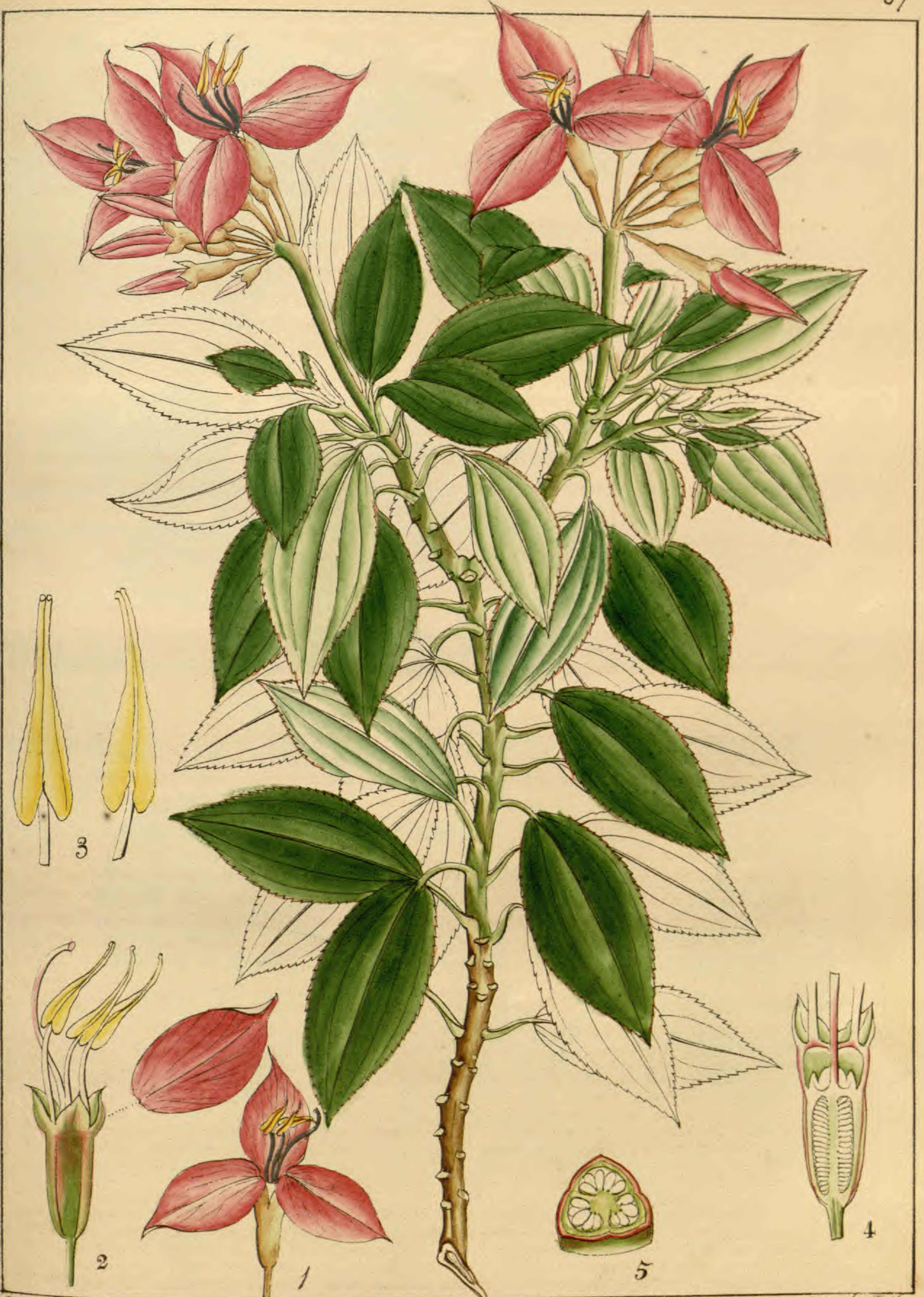
Calyx tube oblong or somewhat 3-angled, cohering with the ovary with 3-6 longitudinal lines : limb trifid, the segments deciduous. Petals 3, ovate-lanceolate, acute. Stamens 3 : anthers oblong, pointed, straightish, bifid at the base, opening at the apex by two pores ; connectivum not produced at the base. Ovary truncated and glabrous at the apex. Style filiform. Stigma obtuse. Capsule turbinate, crowned with the margin of the calyx which is thickened on the inside, 3-celled, 3-valved, the valves opening at the apex only. Seeds cuneate-obovate, sharp and somewhat grooved along one side : hilum at the base.—Herbaceous or suffrutescent usually small plants. Leaves membranous, hairy, opposite, one of them often a little smaller than the other, rarely quite abortive. Peduncles axillary or terminal, few-flowered. Flowers racemose or fascicled, rose-coloured.—*W. and A. Prod. p.* 321.

This genus was founded by Roxburgh for the admission of four undescribed plants known to him. He took the name from a native one given by Rheede, to one he had figured in his Hortus Malabaricus. In 1828, when DeCandolle published the Order in his Prodromus, the genus was so little known, that he was under the necessity of excluding it from the family as one, unknown to him. Fifteen years after, Walpers in his " Repertorium Botanicum," compiled a list of 21 published species, and several have since been discovered. This therefore promises ere long to become a large genus. The three species I have introduced here, are the handsomest I have seen. They seem all to be annuals, except, perhaps, the first, which appears to have a woody stem ; but as, of a great number of specimens gathered, the stems of all seemed of this year's growth, I suspect the root only if even that is perennial, and that the stem is annually cut down by the frost.

Sonerila grandiflora (R. Br.) erect glabrous : leaves elliptic, attenuated at both ends, bristle-serrated, 3-5 nerved at the base : peduncle terminal (always), about the length of the leaves, flattened at the apex, and there bearing a slightly curved raceme of several unilateral large flowers : petals ovate, pointed : style as long as the stamens : stigma simple : capsule glabrous, 3-sided, scarcely the length of the pedicel.—*W. and A. Prod. p.* 322.

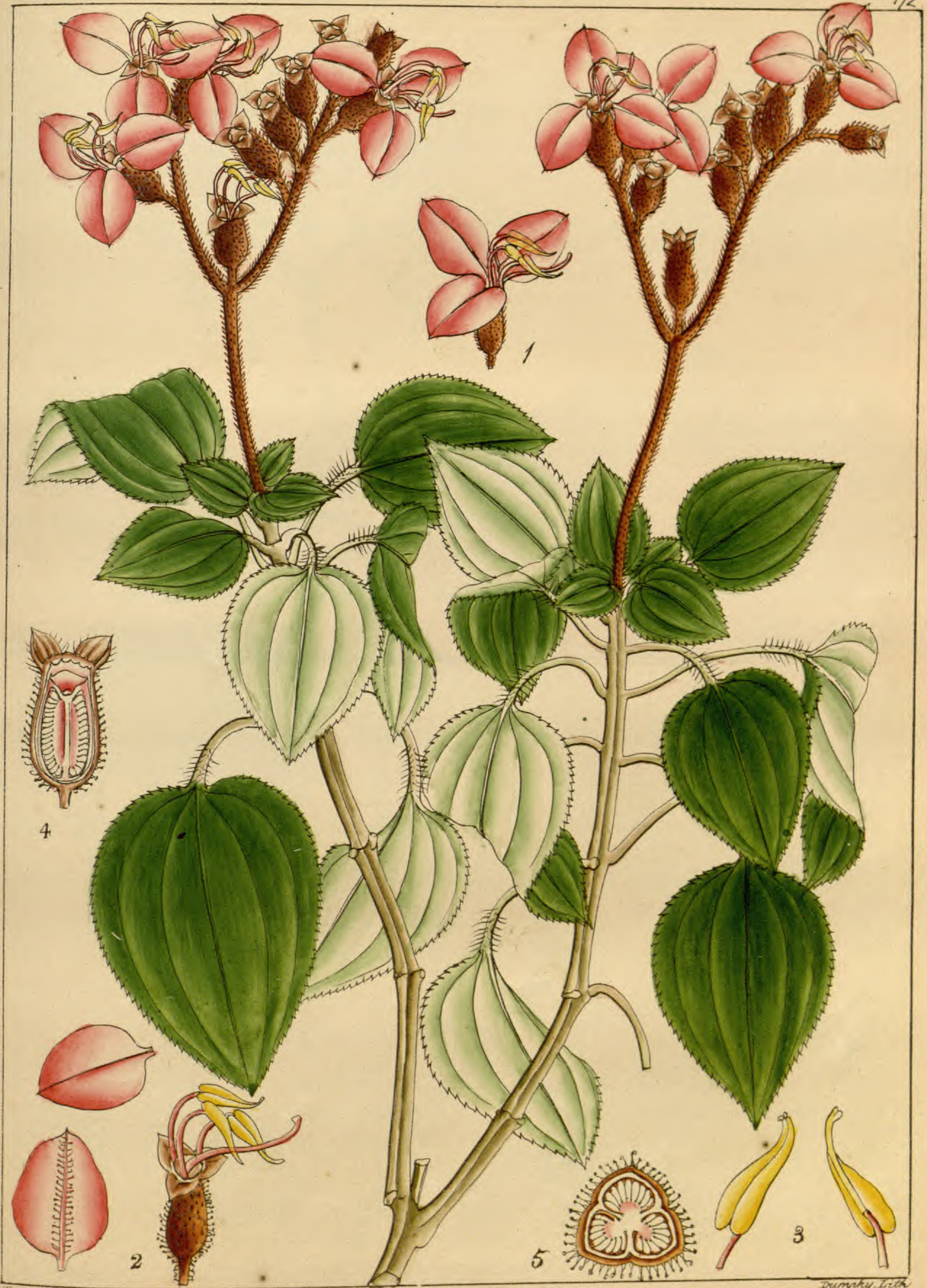
A beautiful plant, and, as compared with the other species of the genus, well named. I have only met with it in one station on the Neilgherries, in Long Valley, about mid-way between the Avalanche and Sisparah. There it occurs in considerable abundance on the banks of a stream by which the valley is intersected. The flowers are of a deep pink, congregated on the ends of the branches. It is an erect suffrutecose plant, from 12 to 18 inches high, the leaves between 2 and 3 inches long and about 1 broad, three to five nerved, the outer pair of nerves often very slender, but in luxuriant plants, such as the one represented, distinctly 5-nerved.

Sonerila speciosa (Zenker) stem erect, subdichotomous at the base, somewhat four-sided : leaves petioled 5-nerved, broadly ovate, acute, mucronately serrated, glabrous ; petioles hairy near the apex : peduncles terminal, dichotomous ; branches afterwards elongating ; flowers secund : calyx and mid rib of the



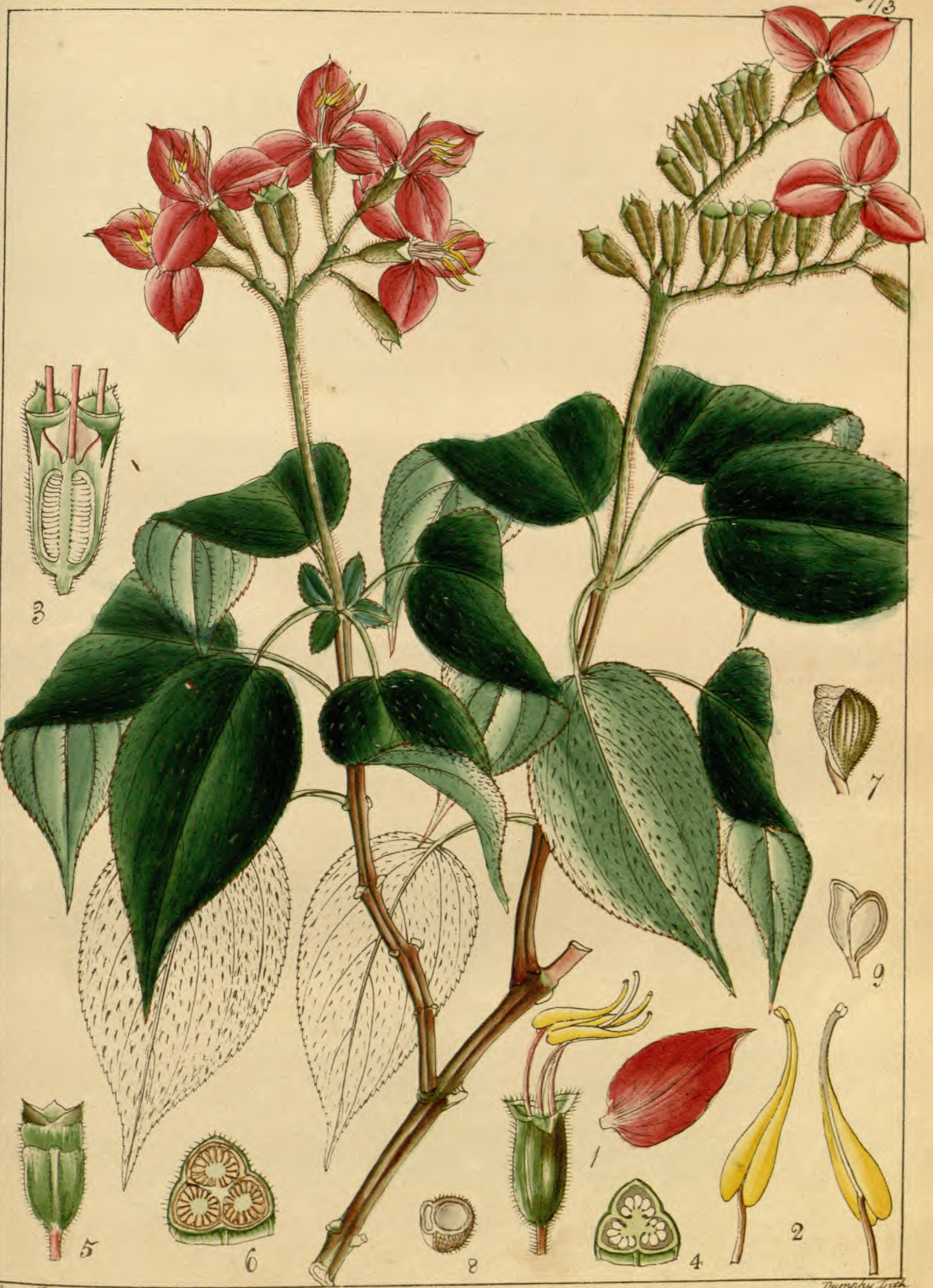
Rungiah, del. Dumphy, Lith.

Sonerila grandiflora (R. Br.)



Rungiah, del. Dumphy, Lith.

Sonerila speciosa (Zenker)

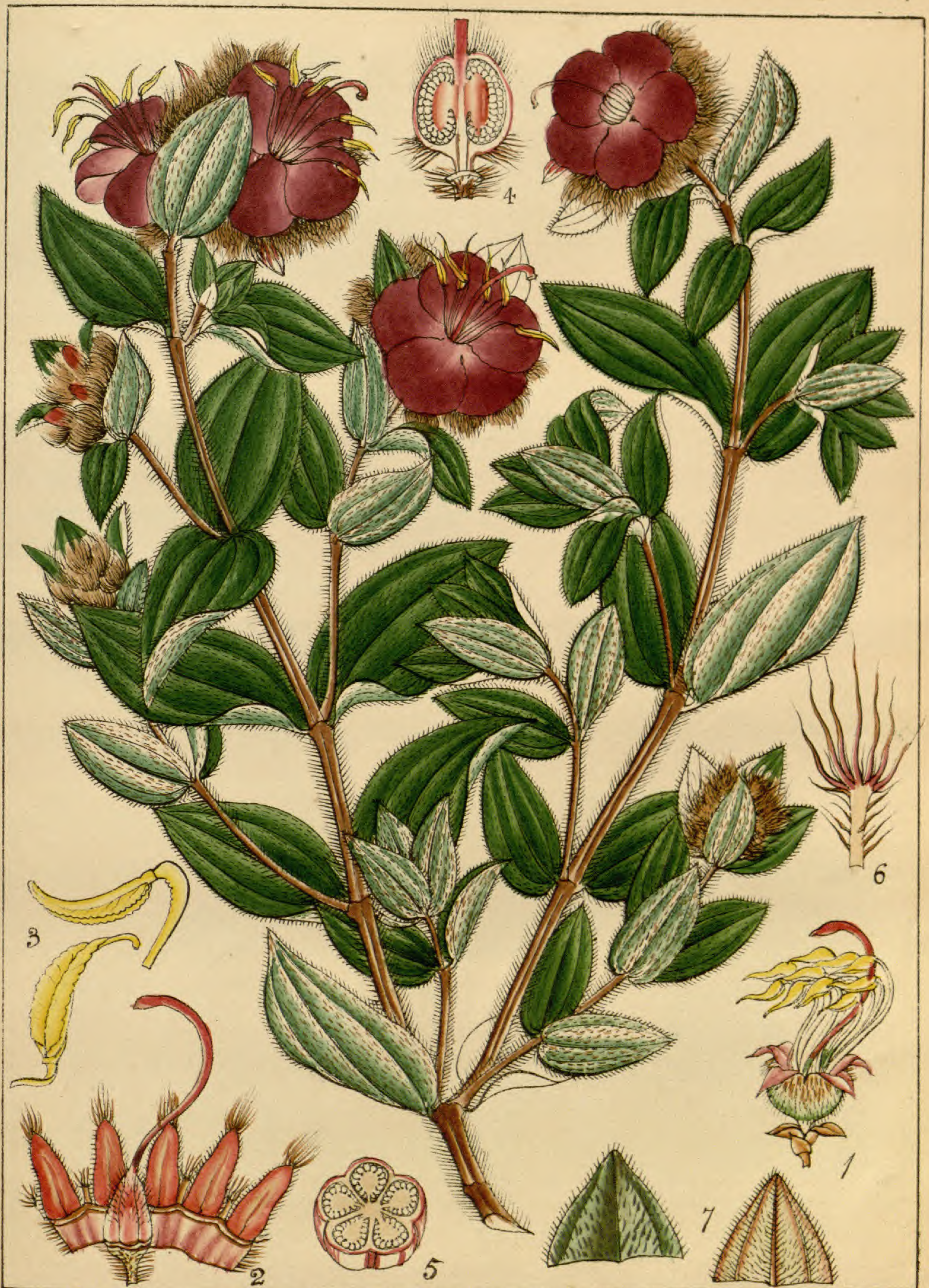


Rungiah, del. Dumphy, lith.

Sonerila eligans (R.W.)

Rungiah, del.   Dumphy, Lith.

Osbeckia Leschenaultiana



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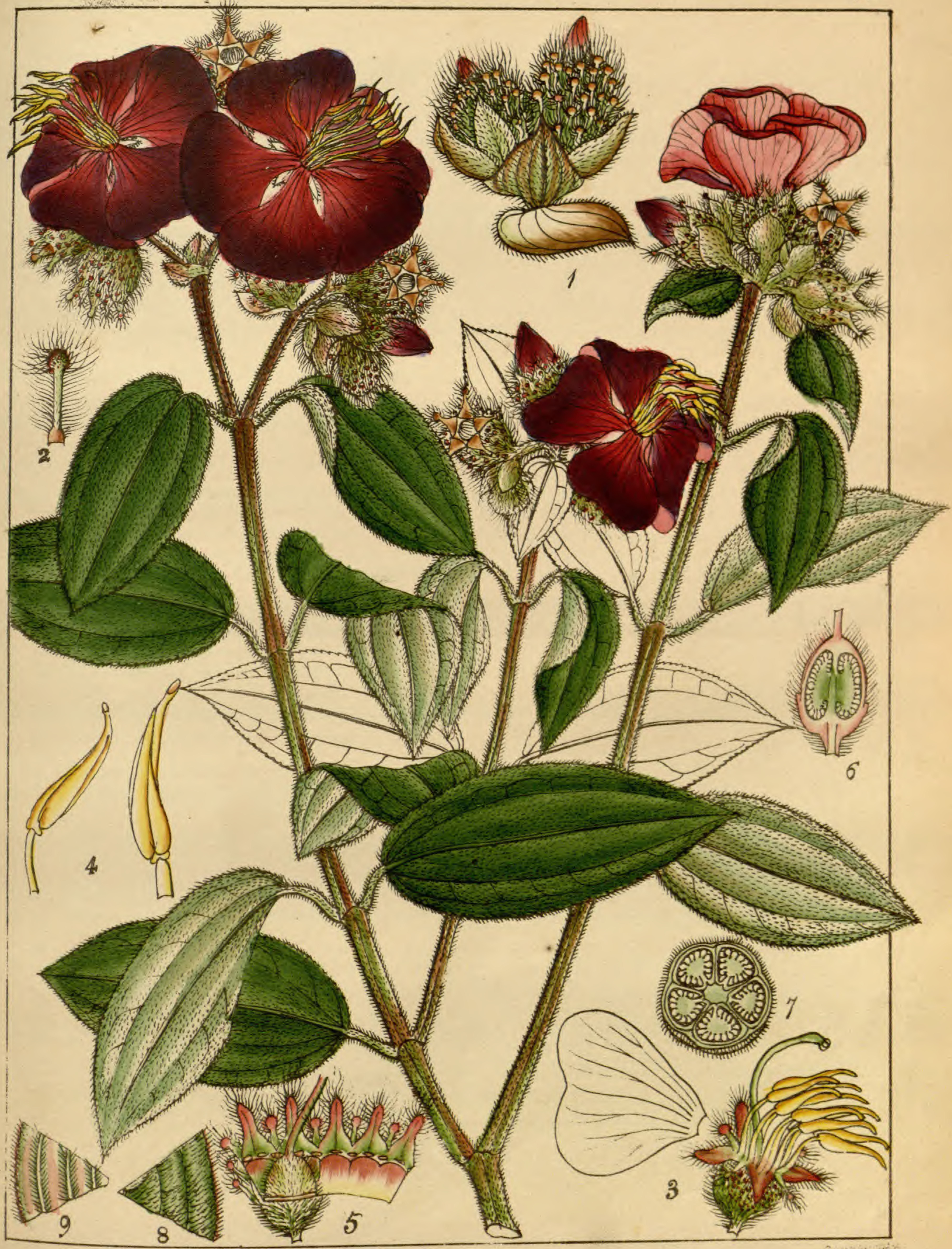
Osbeckia Gardneriana (R.W.)



Osbeckea Wightiana (Benth)

petals, below, covered with short, rigid, glanduliferous hairs : petals ovate, obtuse, mucronate : style and stamens about equal.

Kaitty waterfalls sparingly. On the hills behind the Avalanche Bungalow in moist soil, near springs, very abundant. In full flower in February. This is a large and beautiful species differing from many of its congeners in its ribbed, not pinnately veinous leaves, an important character which Zenker has overlooked in his definition. When seen in perfection this is a very handsome species, with large pink flowers, rarely more than two or three open at once on each branch of the cyme.

SONERILA ELEGANS (R. W.) herbaceous, erect, ramous, hairy : leaves petioled, pinninerved, from ovate cordate to cordate, acuminated, serrulate : peduncles terminal, cymosely dichotomous; branches afterwards elongating : flowers numerous, secund : calyx pubescent : petals ovate pointed : anthers long beaked : capsule hirsute, conical, 3-sided, crowned with the limb of the calyx : seed hairy.

Sisparah, very abundant all along the road side, in flower and ripe fruit in February. A most conspicuous species, at first a few pale pink flowers open, these are followed successively by others as the branches elongate, until at length each branch is several inches long, covered along the upper edge with a row of capsules and two or three flowers at the extremities : the branches in the mean time spreading horizontally, with a backward tendency slightly approach each other, presenting somewhat the form of the letter V, as shown in the drawing. They often become much longer than here represented, bearing on the same peduncle unopened flowers and ripe capsules.

OSBECKIA.

Calyx-tube ovate, usually covered with stellate bristles or pubescence; limb 4-5 cleft, with appendages between the lobes springing from the outside. Petals 4-5. Stamens 8-10 : filaments glabrous : anthers nearly equal and similar to each other, shortly rostrate or very rarely truncated, opening by a single terminal pore; the connectivum with 2 short auricles at the base. Ovary covered with bristles at the apex. Capsule 4-5 celled. Seeds cochleate : hilum orbicular, at the base.—Herbaceous or usually shrubby plants. Flowers terminal. —*W. and A. Prod. p.* 322.

Species of this genus are common to Asia, America, and Africa, but I believe upon the whole predominate in Asia. They are for the most part large flowered handsome plants, and under cultivation would, I should suppose, become very ornamental additions to the flower garden. Several species are natives of the Hills, of these I have selected three of the handsomest to illustrate the genus. *O. Leschenaultiana* is common about Kotagherry and Nedawuttem, flowering August and September. *O. Gardneriana* is equally common about Ootacamund; while *O. Wightiana* is more frequent about Coonoor and Kaitie.

OSBECKIA LESCHENAULTIANA (D. C.:) shrubby : branches 4 angled, beset with stiff hairs : leaves sessile, ovate, somewhat acute, approximate, 5-nerved villous on both sides : flowers sessile, bracteated, about 3 together, capitate : calyx tube globose, covered with palmately ciliated short scales; segments 4, lanceolate (D. C.) petals obcordate, bluntly mucronate : stamens 8 ; anthers clavate, truncated, curved : ovary crowned with a tuft of bristles. (R. W. MSS.)

Frequent about Kotagherry, flowering during the autumnal months. Flowers small, compared with those of most of the other species of the genus, and in proportion to the size of the plant, which often attains a height of between two and three feet. They are nearly white, dashed with crimson spots. It associates with *O. truncata* in its beakless anthers and small flowers, but is in all other respects amply distinct. The flowers in DeCandolle's specimens seem to have been imperfect, as he has not alluded to the petals or stamens.

OSBECKIA GARDNERIANA (R. W.) a large erect ramous shrub, all the young parts clothed with long bristly hairs : leaves sessile, ovate, 3-nerved; usually with two short slender lateral ones near the base, pubescently hairy on both sides : flowers terminal capitate : calyx tube short, campanulate, closely covered with ligulate and, towards the apex, clavate adpressed scales, furnished with numerous long dark red or rusty coloured bristles ; limb 5-cleft, divisions linear, lanceolate, obtuse, more than twice the length of the appendages, both covered with bristles : petals 5, orbicular : stamens 10, anthers recurved, corrugated on the inner edge, shortly beaked.

This, which is the largest and most conspicuous species found on the Hills, is very abundant in the woods about Ootacamund, extending westwards as far as Sisparah. In favourable situations it becomes a large bush 8 or 10 feet high, though generally about 4 or 5 ; flowering in profusion during February and March, when it is indeed a striking object. At first sight it seems very nearly allied to *O. Wightiana*, but a closer inspection shows that they are quite distinct species. The kind of hair with which the leaves of the two species are clothed, is very different; in this they are scattered, long and soft, like rough pubescence, hence I have made use of that term to distinguish them ; while in the other they are very dense, stiff and closely adpressed, giving in some lights an almost metalic lustre to their surface—here the leaves are 3-nerved, there 5 to 7—here the scales of the calyx are partly ligulate, there they are capitate ; here the bristles with which the calyx is clothed are of a deep rusty brown and very long, while there they are nearly white and comparatively short. And lastly, the flowers are much smaller in this than the other. I have dedicated this noble species to Mr. George Gardner, the Superintendent of the Royal Botanic Garden of Ceylon, as a lasting memorial of the many agreeable hours spent with him in exploring the vegetable treasures of these Hills,

many of which discovered for the first time during that excursion, will embellish this work, and also to my high estimation of his great Botanical attainments.

Osbeckia Wightiana (Benth.) shrubby: branches herbaceous, scabrous with short bristles: leaves nearly sessile, ovate, slightly acute, quite entire, 5-7 nerved; upper side covered with adpressed, somewhat shining hairs; under hirsute on the nerves, and shortly tomentose between them: flowers (large) terminal, at first densely capitate and bracteated, afterwards often solitary: calyx campanulate, densely covered with short adpressed capitate scales, bearing, a tuft of long bristles at the apex; segments 5 deciduous; appendages deciduous, covered with bristles: anthers 10, linear-oblong, scarcely beaked: style clavate.—*W. and A. Prod. p.* 323.

This species is rare about Ootacamund; but about Coonoor and Kaitie Falls, it is common. It is readily distinguished from the preceding, by the short ridged shining adpressed hairs with which the 5 to 7-nerved leaves are covered, and by the calycine bristles being nearly white, while in it they are a deep brownish red.

XXIX.—MYRTACEÆ.—MYRTLE TRIBE.

This is a family of great extent, and has engaged much of the attention of Botanists in elucidation of its connections, its genera, and towards the discrimination of its numerous species; much however is still required, as up to the present time, it seems a very heterogenous assemblage, and apparently one of the most difficult to define.

It includes some very interesting plants; such as the clove tree, the Jamaica pepper tree or All-spice, the Rose-apple, the Guava, and a host of others; and generally its species are remarkable for their handsome flowers, and the aromatic odour of their foliage when bruised; owing to their containing in numerous little cells, a quantity of an aromatic essential oil, which can be seen collected in transparent vesicles when held between the eye and the light, in the common myrtle they are easily seen.

This is one of the best distinguishing marks of the family. Any one finding a plant with opposite leaves and calyciflorous flowers, that is, the stamens and petals growing from the cup of the calyx, may feel almost certain it belongs to this family if the leaves have transparent dots. Care, however must be taken not to confound them with the Hypericums or the Rutaceous family, which differ in having a superior ovary, while the Myrtles have an inferior one, that is, in other words, the young fruit is seen below the flower.

The dotted leaves though general, are not universal: they are wanting in the guava and some others, and in many, are so minute as to require the aid of a magnifier to see them. In the *Myrtus tomentosa*, they are also wanting, which circumstance induced me carefully to compare this plant with *Myrtus communis*, the type of the genus, when I ascertained, that they could not be associated as true congeners, and that the former must be separated to form the type of a new genus. Salisbury long ago suggested their separation, and DeCandolle has partially accomplished it, by placing this along with *Myrtus spectabules*, (the type of another genus,) in a distinct section, under the name of *Rhodomyrtus*, with the character, "*Flores rosei. Semena compresso-plana in loculis biseriata.*" This name I therefore adopt for the genus. It is allied on the one hand to Myrtus, by its 3-celled ovary and osseous seed, but differs in their simple double series compressed form, horizontal position, even in the ovary, and in habit. On the other, it approaches the Guava (Psidium,) in habit, its impunctate leaves and succulent fruit; but differs in its 3-celled ovary, its flattened seed, not nidulating in pulp, and its 3-nerved leaves. It seems to form the transition from the one to the other, agreeing with neither, but largely partaking of the characters of both.

The order is very widely distributed, but greatly predominates within the tropics or in the warm latitudes immediately adjoining on either side. Numerous species are natives

of America, Asia, and New Holland, fewer have yet been found in Africa; but it has not been so well explored. The number of species referred to this order, I estimate by a rough calculation at from 1000 to 1200, but I think it probable my estimate is under the true number, as there are 70 genera, and some including upwards of 100 species, one *Eugenia* above 300. One species only is a native of Europe, that from which the family takes its name *Myrtus communis,* and that is confined to the southern latitudes.

Such being the case, it is natural to suppose, that in a climate partaking so largely of the European character as this does, that the number of species should be small. And this is the case, four only being found on the higher ranges : while as we descend to the plains, on all sides, the numbers increase. Those however that do occur here are very abundant, and three of the four, stately trees ; the fourth *Myrtus tomentosa*, or, as I now propose to designate it, *Rhodomyrtus tomentosas* is generally a shrub, though sometimes it attains almost arboreous dimensions.

The relations of this order with its neighbours are sufficiently extensive and varied, and as it now stands, being loosely defined and very polymorphous, affinities with a great number can be easily traced. The essential character of the order is, an adherent ovary: stamens usually indefinate not induplicate in æstivation, (that is the filaments are not folded on themselves as in *Melastomaceæ,*) leaves pellucidly punctuate. Exclude the last clause —leaves pellucidly punctuate—and then the following may be included under the rest of the definition—*Pomaceæ, Combretaceæ, Alangieæ, Rhizophoreæ, Philadelpheæ,* and *Onagrariæ.*

From this it would appear the characters of Myrtaceæ are rather of a negative than positive kind, and that to discover a Myrtaceous plant, we must first ascertain that it does not belong to any of the above orders, and then we may infer that it belongs to this. Ordinal distinctions taken from the ovary and fruit, can have no place here, for among the sections and genera we find nearly all kinds. The flowers and leaves alone supply the ordinal characters, the ovaries and fruit sectional and generic ones.

The Pomegranate was long associated with this family. Don removed it as the type of a new order, in this he has been followed by most Botanists: Endlicher has, however, restored it to its old place, but I think incorrectly, as it assuredly is not a Myrtaceous plant. The late Mr. Griffith referred it to *Lythrarieæ,* and I now think he is the only Botanist who really understood its true structure and affinities.

I have already alluded to some of the economical applications of the species of this family, one rather curious property remains to be noticed ; namely, that the juice of the *Rhodomyrtus,* when simply boiled for some time yields without the aid of sugar, a jelly of as firm a consistence as animal jelly, a circumstance, I believe, of rare occurrence among vegetable juices.

RHODOMYRTUS—R. W.—MYRTUS—Sect. II—DC.

Calyx tube conical, limb 5-lobed, æstivation quincunctial: petals 5, æstivation imbricated : stamens indefinite : ovary 3-celled : ovules in a double series superposed, horizontally compressed, incurved and reniform : seeds like the ovules subreniform, compressed, horizontal, 2 series, testa bony : embryo terete the shape of the seed.

Shrubs or small trees with opposite, oval, 3-nerved, coriaceous impunctate leaves, at first pubescent, afterwards subglabrous above, villous or tomentose beneath, peduncles axillary, 1-3-flowered with 2

bracteoles at the apex : calyx and outer surface of the petals tomentose, calyx lobes suborbicular quincunxly embracating on the margins : petals subelliptic, redish within, clothed exteriorly with white adpressed pubescence : stamens very numerous, filaments slender purplish, anthers small : style as long as the stamens, tapering upwards : stigma capitate : berry globose, tomentose, soft succulent and yellowish when ripe, crowned with the persistent lobes of the calyx.

As already stated, this genus occupies a place intermediate between Psidium (Guava,) and Myrtus ; it has much of the habit of the former, but differs widely in its ovary. In habit it is widely distinct from Myrtus communis, the only genuine species I know, and also in its ovary the cells, having invariably 2 rows of collateral ovules, while in Myrtus there are four. In the form of the seed they also differ, in this they are always compressed and horizontal ; in that thick approaching to globose on the back, very few (at least in this country) coming to maturity, while in this nearly all do so.

RHODOMYRTUS TOMENTOSAS (R. W.) *Myrtus tomentosa*, Aiton Hort, Kew and others. Myrtus (Rhodomyrtus) tomentosa.—*DC. Prod.* 3, *p.* 240.

Very common on every part of the Hills, where it is generally known as the " Hill gooseberry," a name far from inappropriate, as it a good deal resembles that fruit, and when ripe is very palatable. The jelly obtained from them is much used, as it much resembles apple jelly both in taste and appearance.

The plant equally abounds in some parts of Ceylon, or one *very* like, in Malacca, China, &c., in all of which places the fruit eat.

EUGENIA.

Calyx tube short, nearly globose, or variously elongated ; limb 4 or 5 cleft. Petals 4 or some multiple of that number, 8-12—rarely five. Stamens numerous, distinct. Ovary 2-celled, with numerous ovules attached to axillary placentæ. Berry crowned by the segments of the calyx, one, or rarely two-celled. Seeds one or two large : cotyledons thick and fleshy, partially or completely combined into one mass with the radicle : radicle very short scarcely distinguishable.

Trees or shrubs with opposite, entire, pellucid-dotted leaves and axillary or terminal, solitary or aggregated peduncles either simple and one-flowered, or racemose, cymose, or panicled. Flowers small and very numerous, or large conspicuous and comparatively few, usually white but sometimes coloured. Fruit a succulent few seeded berry, white, pale redish, or deep purple coloured, usually sweetish, sometimes combined with a peculiar rose flavour, (as the rose apple,) at others rough and astringent.

This is a very extensive and complex genus, but at the same time, when properly understood a very distinct and natural one, essentially resting on points of structure not liable to change, the number, namely, of cells, of the ovary and peculiar formation of seed.

When DeCandolle undertock its elaboration for the third volume of his Prodromus, he seems to have felt the task a difficult one, owing to the ever varying forms its numerous species present. Here we find almost side by side, small shrubs and large trees inflorescence of nearly every imaginable form, flowers the most minute and clustered on one species, on another large, showy and distinct, usually white, but as in the case *Eug.* (*Jambosa*) *Malaccenses*, deep crimson. On more closely analysing the parts of the flower, we find some with the calyx tube very short, almost inconspicuous, in others forming a little ball under the flower, and in others lengthened out into a long cylinder like tube exceeding an inch in length. The limb in like manner is either deeply lobed, merely toothed, or cup-shaped, and quite entire on the margin. The petals for the most part expand in the usual form, but in the subgenera *Syzygium* and *Caryophyllus*, they are, in the flower-bud, usually so closely adpressed to each other that they never open, but are forced off all in one, like a lid, by the progressive enlargement of the enclosed stamens.

To several of these secondary variations, notwithstanding the uniformity of the more essential organization, he attached generic value, and divided the genus into four or five genera, *Eugenia* had the limb of the calyx cleft down to the ovary. *Jambosa* had a turbinate calyx tube attenuated at the base, and the limb 4-cleft. *Acmena*, a turbinate calyx tube, and the limb entire. *Caryophyllus*, a cylindrical calyx tube, 4-parted limb, and four cohering petals ; and lastly, *Syzygium* had an obovate calyx tube, subentire limb and concreted petals separating like a lid.

Rungiah Dumphy, Lith.

Myrtus tomentosa

Rungiah, del. Dumphy, Lith.

Eugenia (S) arnottiana (R.W.)

Rungiah, del. Dunphy, Lith.

Eugenia (S) calophyllifolia (R.W.)

While engaged in preparing the article *Myrtaceæ,* for my Illustrations of Indian Botany, the futility of such characters in the formation of genera, was rendered strikingly obvious by two or three species in my herbarum, which neither associated with any of these, nor would they unite with each other to form *one* additional genus. Each required to be elevated to the rank of a genus resting on characters equally artificial with any of those given above. This circumstance induced me to examine with much care, the characters of all these genera, as given by DeCandolle, which led to the conviction that they are, at best, all mere sections or subgenera of one vast and very natural genus, differing from each other more or less in habit, and in the form of parts of secondary value in the formation of genera, but corresponding in those of really essential importance —the position, structure and contents of the ovary; structure of the seed, and position of the radicle. In these points they all agree, and to the same extent differ from the rest of the family of *Myrtaceæ.* This last fact had much influence in inducing me to re-unite all the above named genera into one comprehensive whole.

The genus thus formed is one of great extent, including probably not fewer than 400 species. These are distributed generally over the tropics and warmer latitudes on either side. America, Asia, Africa and New Holland, all claim indigenous species, but they most predominate in America, and are very sparingly distributed in Australia. Three species of the subgenus Syzygium, present themselves in the woods about Ootacamund, and one of these occurs on the top of Dodabet, a fourth is met with on the lower levels of Coonoor and Kotagherry, but rarely ascending above that level. On the Western slopes *E. Munronii,* referable to the subgenus *Jambosa,* occurs some distance below Sisparah.

The following characters of the subgenera of this extensive genus, I extract from my illustrations slightly modified :—

1. Eu eugenia. Calyx tube globose; limb 4-parted down to the ovary. Pedicels axillary, one flowered.

2. Jambosa. Calyx tube turbinate rarely cylindrical; limb produced considerably beyond the ovary, cup-shaped, margin 4-cleft. Cymes lateral or terminal, flowers usually large: fruit often edible.

3. Caryophyllus. Calyx tube cylindrical, limb deeply 4-cleft. Cymes terminal, somewhat corymbose. Flowers highly aromatic.

4. Acmena. Calyx tube long clavate, much produced beyond the cell of the ovary; limb truncated entire, or repandly 4-5-lobed. Flowers numerous, inflorescence variously racemose or corymbose, petals 4-5 or numerous—8-12—free or cohering.

5. Syzygium. Calyx tube short, contracted, pedicel-like; limb dilated cup-shaped, much produced beyond the ovary, margin truncated, or repandly lobed. Cymes corymbose, flowers small, petals usually cohering.

Eugenia (S) Arnottiana (R. W. Ill. Ind. Bot. *Syzygium densiflorum* Wall.) leaves elliptic, oblong, acuminate, folded, coriaceous, dotted: cyme dense, corymbose; peduncles lateral, general and partial stout, the partial ones short and bearing at the apex an umbel of 8-12 almost sessile flowers subtended by oblong-linear caducous bracteas; calyx shortly tubinate; limb cup-shaped, shortly and bluntly 4-toothed or lobed: petals expanded before falling off.—*W. and A. Prod. p.* 329.

Abundant in the jungles about Ootacamund, and generally met with in the woods on the higher hills. It is a beautiful tree, generally of low growth, with wide spreading branches forming a fine umbrageous head. It is in its greatest perfection in February and March, when covered with thousands of large clusters of flowers. In May and June it is covered with myriads of its oblong dark purple succulent austere tasted fruit. The Cotyledons are thick and fleshy placed horizontally one above the other with a small radicle between.

The fruit, which is sweetish and austere, is eat to a considerable extent by the natives, though, owing to its astringency, by no means palatable.

Eugenia (S) Calophylifolia (R. W. Illust. Ind. Bot.) arborious, ramuli, 4-sided: leaves approximated towards the ends of the branchlets, from oval, very obtuse, to obovate-orbicular, coriaceous; veinless above, penninerved beneath, when dry, slightly revolute on the margin, not dotted: cymes terminal, corymbose, short peduncled, many flowered: calyx repandly 4-toothed: petals 4, orbicular, separating as one: berries oval, oblong, succulent, dark purple when ripe.

A low spreading tree, very abundant in the woods about Ootacamund. The flowers are exceedingly numerous but make no show, so few in each cluster opening at the same time. The tree itself however is a very beautiful one, with a fine round umbrageous head. It is to be met with in flower at all seasons, but is in greatest perfection in March and April. The fruit is so like those of *E. Arnottiana,* that the same description will serve for both.

XXX.—PASSIFLORIÆ—PASSION FLOWER TRIBE.

In Indian Botany this is a family, of very minor importance as so very few Asiatic species belong to it. There is but one native species of Passion Flower in the Indian Peninsula, and, so far as yet known, only found on the Hills. A second is found on the Hymalayas, and one or two in the Eastern Islands. All the other species, nearly 150 in number, are with the exception of a few African ones, natives of America. The few that are found in India, are however interesting as forming so many links of the chain connecting the floras of the two countries. It was principally under this point of view, that I was induced to introduce the Neilgherry Passion Flower into this collection, as I had already published it in my Icones, and there is certainly nothing very striking in its appearance to entitle it to the distinction of being published a second time, as it is in truth, about the plainest looking species of this curious and generally handsome genus, I have seen.

It is met with in considerable abundance on the Hills growing in woods, and climbing extensively over the trees. The flower though plain, when looked at as a whole, owing to the want of the bright colours which many of its congeners present, is by no means wanting as regards the perfection of its parts when more closely examined. Here we find a double series of floral leaves or a calyx and corolla, while many have the outer series only. Here we have a double series of filamentous processes, the same as in the most perfect, and lastly there is within these, a membranous tissue plaited with the greatest nicety, surrounding the base of the pedicel of the ovary, properly to appreciate the beauties of which the microscope is required. Within that, borne on an elevated torus, or pedicel, embraced by the base of the stamens, is the ovary or embryo fruit, surmounted by three diverging capitate styles. Such is the structure of the Neilgherry passion flower.

Considerable difference of opinion exists among Botanists, regarding the nature of the parts of the flower. Some maintain that it has no corolla even in those instances where, like the present, there is a double series of floral leaves, and therefore call them all sepals, though the interior series are petaloid in their appearance, colouring and texture, and say the crown or filamentous processes rise from the cup of the calyx. Jussieu, DeCandolle, Endlicher, and Meisner all adopt that view. Lindley on the other hand, maintains that the inner series are true petals, and that their crown is metamorphosed petals. Dr. Arnott and myself considered the second series petals, but viewed the crown as more properly belonging to the stamens.

When preparing my account of the order for the illustration of Indian Botany, I was induced to take a view somewhat different from either, considering both series of floral leaves sepals and the crown, as modified corolla. A very careful examination of this species has induced me to adopt Dr. Lindley's opinion, as being the more correct of the three, as I think it can be shown that both the inner series of floral leaves and the crown, arise from the exterior edge of a disk, lining the throat of the calyx, while the stamens spring from the interior edge, proving that both the crown and inner series of leaves belong to the same series of parts and are equally distinct from both calyx and stamens. Lindley however seems subsequently to have relinquished the idea of the crown being metamorphosed petals, and in his elements of Botany, (a more recent publication than his natural system,) at page

Rungiah, del. Dumphy, Lith.

Passiflora Leschenaultii (D.C.)

203, defines his "Alliance *Passionales*," "Flowers with a ring or coronet of sterile stamens," a view which my present examination does not enable me to adopt.*

This discussion is introduced to show how gradual the transition of parts sometimes is, and that in such cases much discrimination is required to enable the investigator of natural objects, to call parts by their right names.

Regarding the properties of the family almost nothing seems to be known. The fruit of some is edible and is said to be "fragrant, juicy, cooling and pleasant."

PASSIFLORA PASSION FLOWER.

Flowers bisexaul. Calyx-tube very short. Corona composed of numerous filaments in several rows. Anthers reflexed. Berry stalked, usually pulpy, rarely somewhat membranaceous.—*W. and A. Prod. p.* 352.

This genus as already remarked, is one of great extent, though so sparingly found in India. The species are either herbaceous annuals or climbing shrubs, admirably adapted for arbours, as well on account of their rapidity of growth, as on account of the profusion and splendor of their flowers, whence it is with great justice said, "Passion flowers are the pride of South America and the West Indies, where the woods are filled with their species, which climb about from tree to tree, bearing at one time flowers of the most striking beauty, and of so singular an appearance, that the zealous Catholics who discovered them, adapted Christian traditions to those inhabitants of the South American Wilderness : and at other times fruit, tempting to the eye and refreshing to the palate."—Lindley. The Indian plant cannot compete in richness of colouring, with those forest jems of the Western World, but still it does not merit the total neglect with which it is treated by the European sojourners on these Hills. I therefore hope this notice, by directing attention to the fact of our having a native Passion flower among us, will also have the effect of bringing it into vogue.

Passiflora Leschenaultii (DC. :) climbing : leaves half-orbicular, rounded at the base, somewhat truncated and 3-cuspidate at the apex, pubescent on the under side, but particularly so on the nerves, without glands : petioles with two glands about their middle : tendrils simple : peduncles in pairs from the same axils as the tendrils, simple, 1-flowered : calyx without an involucre ; petals 5.—*DC. Prod.* 3. *p.* 326 ; *Wall. ! L. n.* 1231 ; *Wight ! cat. n.* 1154.—Neilgherries.—*W. and A. Prod. p.* 352.

A rather common extensively climbing shrub, growing in woods about Ootacamund, but more abundantly and in greater perfection at the lower levels of Kotagherry, Coonoor, the Avalanche, &c. The flowers are small compared to some of the finer species, but larger than several I have seen in cultivation, and much thought of too ; the colours though not bright are yet so vivid as to bear close inspection though little conspicuous at a distance, a kind of modesty which I apprehend as tended to keep them in the back ground.

It is generally in flower at all seasons, but most abundantly during the rainy ones. I have not heard of the fruit having been tried, nor have I ever had the curiosity to taste it myself. It is about the size of a pigeon's egg, purple when ripe.

XXXI.—CRASSULACEÆ—STONECROP TRIBE.

This is a family of succulent plants, of which a good many are natives of Europe, but many more of the Cape of Good Hope, where succulent plants of all kinds are most abundant. In India they are so very rare, that our peninsular Flora only includes 5 species,

* When this sheet was passing through the press I received some unpublished papers of the late Mr. Griffith, who has most elaborately dissected and delineated the progressive developement of the flower of *P. kermesina*, from its earliest stages, and concludes from his examination, that the coronal processes are neither metamorphosed petals nor stamens. He says, "the processes or ciliæ are ulterior, neither (them nor the tube of the calyx) appearing until the ovules have commenced being coated, and the anthers so far perfected as to present parent cells." His dissections further show that both the stamens and petals are formed before any trace of the coronet is perceptible. He thence infers, "that their late appearance and irregularity, connected with their outside station, is a proof that they are not *stamenal*, but mere cellular processes from the tube of the calyx." Lastly he remarks, "The processes are of late appearance, the sepals being hooded, the stamens sulcate down the middle, the petals rather larger, the pistillum a three lobed disc before any signs of processes." —See Griffith's posthumous papers now publishing in Supt. to the Calcutta Journal of Nat. History.

and one of these a doubtful native. The one here delineated is, however, very common on the Hills, and has moreover been generally introduced into the gardens, probably more on account of the facility of propagation than any thing else, for indeed, nothing can be easier to propagate than this plant. In habit this, the only Neilgherry plant of the order, is perennial, very succulent, attains a considerable size, and during the earlier months of the year, is covered with large clusters of yellow flowers which continue appearing in succession, for two or three months. Towards May they have pretty generally disappeared, but plants are still to be had even at that advanced season in flower.

This, in common with the whole family, is distinguished by the exact symmetry of its flowers; 4 sepals, 4 petals, 4 carpels, and 8 stamens. These numbers vary in different genera, but the proportions remain the same, and by their regular alternation, this family is readily distinguished from all its neighbours. DeCandolle's classification of this family does not appear to me by any means a satisfactory one, and has not been adopted by either Lindley or Endlicher. *Saxifrageæ*, a family as yet undiscovered on these Hills, seems clearly its nearest relative, but from which it is easily distinguished by the number of carpels, which in this equals the number of petals and are free to the base, while in Saxifrageæ, two is the number of carpels with usually 5 petals. There is also a difference in the placentation worthy of notice in determining affinities.

I have never heard of any useful application to which this plant has been turned, in Europe the leaves of the Houseleek are esteemed for their refrigerent properties and in my younger days I was familiar with it under the name of, "Healing leaf," and thought it a sovereign remedy for all manner of external sores or injuries. Some of the stonecrops are very acrid.

KALANCHOE.

Calyx 4-partite; the sepals scarcely combined at the base, narrow acute, somewhat distant. Corolla hypocrateriform; tube cylindrical: limb spreading 4-partite. Stamens 8, attached to the tube of the corolla at the base. Scales 4, linear. Carpels 4. Styles filiform.—Suffruticose fleshy plants. Leaves opposite, irregularly pinnatifid or ovate, usually toothed, thick. Cymes panicled, lax. Flowers yellow, or rarely reddish or whitish.—*W. and A. Prod. p.* 350.

This, tho' a small genus as respects the number of species, (about 16) but makes up by the extent of ground they are spread over. India, from the Hymalayas to Cape Comorin, Ceylon, Moluccas, China, Arabia, Egypt, Sierra Leone, Cape of Good Hope and Brazil, all claim indigenous species. Of the 16, four belong to the Indian Peninsula, and are all to a certain extent, variable in their forms to such an extent, as occasionally to render discrimination very difficult.

Kalanchoe grandiflora (Wall.:) glabrous: leaves broadly obovate, crenated, upper ones obtuse: cyme corymbose, lax: sepals oblong, acute: segments of the corolla oval, bluntish, with a short hooked mucronate point.—*Wall.! L. n.* 7226; *Wight! cat. n.* 1174.—K. Wightiana, *Wall.! L. n.* 7225.—Dindygull hills, at an elevation of 3000 feet. Neilgherries. —*W. and A. Prod. p.* 359.

This plant usually occurs in rocky places, and when in the neighbourhood of springs, often attains a large size; its yielding succulent branches bending under the weight of their numerous large succulent leaves. Leaves roundish obovate, crenated on the margin, of a bluish green or glaucous colour; the upper ones frequently tinged with red and traversed with deeper coloured veins: cymes terminal corymbose, furnished with conspicuous ovate or suborbicular bracts at each division, flowers large quaternary with 8 stamens, rising from the tube of the corolla, scarcely excerted, anthers oblong, furnished with a minute capitulate appendage: 4 linear scales within, opposite the pistils: pistils 4, slightly adherent in the centre, each terminating in a slender filiform capitate style, ovary with very numerous minute ovules attached to an elongated central placenta: fruit somewhat globose, but rarely attains maturity.

Rungiah, del. Dunphy, Lith.

Kalanchoe grandiflora (Wall)

XXXII.—UMBELLIFERÆ.

This is a large family, very extra-tropical in its habits, and peculiar in its properties. On the plains of India they are almost unknown, but on the higher hills they are not by any means uncommon either as to the number, or the frequency of individual species. In Europe, however, their numbers are out of all proportion greater, here we have at the utmost some 15 or 20 species distributed over an area of probably 1000 square miles; there, in autumn, walking across a meadow, of perhaps less than 5 acres in extent, as many may often be found.

In its properties this family is very remarkable. The seed, or more properly fruit of nearly the whole are aromatic and carminative, not even excepting those of the most poisonous; while the vegetation of all is suspicious and ought to be used with great care until qualified by culture, or ascertained by experience to be innocuous. The Hemlock and Fools Parsley, both very poisonous plants, are members of this family with many others nearly as bad; but so are the true Parsley, Celery, Carrots, Parsnips, Samphire and many others that are in daily use as wholesome articles of food. Notwithstanding this medley of virulent poisons, medicinal virtues, and wholesome properties, the whole family viewed Botanically, is one of the most natural of the vegetable kingdom, and the most uniform in the structure of its flowers and fruit. An inferior, nearly entire or 5-toothed, calyx, 5 petals, 5 stamens, a 2-celled ovary and fruit with 2 pendulous albuminous seed, are points of structure common to the whole order: generally they are herbaceous with hollow stems, sheathing leaves, and umbelled inflorescence. This last varies as in the case of Hydrocotyle, and some others where the flowers are capitate.

Owing to this uniformity of the structure of the flowers, fruit and inflorescence, this has proved one of the most difficult families to subdivide and groop into tribes and genera; and these subdivisions, as now limited, for the most part rest on characters so minute, that even skilful Botanists sometimes find it most difficult to make them out. Such being the case, it has followed as a natural consequence, that various attempts have been made to distribute them in such a way as to facilitate their recognition, but hitherto with indifferent success. That given by DeCandolle, the one followed by us in the peninsular flora, is that now generally adopted; and those wishing information regarding it, may refer either to that work, or to my Illustrations in which its principles are explained, as it would be out of place in this work to undertake the explanation of such a complex arrangement.

As stated above, this, in its economical relations, is an important family; some valuable articles of food are obtained from it, such as the Carrot, Parsnip, Celery, Parsley: as medicine, the aromatic properties of the seed of many render them valuable, as warm, stimulating, carminatives; while the leaves of the Hemlock, used with judgment, are in some forms of disease a most powerful remedy, but unfortunately uncertain in its operation; apparently owing to its properties varying with the age at which the plant is gathered, and also according to the season. Several others are virulently poisonous, and are often destructive to cattle to a great extent, especially in spring. None of those found on the Hills are referable to this last class. I do not recollect any having been cultivated for ornamental purposes.

I refrain from any remarks on the affinities of this order for the very simple reason, that I do not myself understand them. There is nothing else like it in the vegetable kingdom. The Vine and the Ivy have each points by which they approach them, especially in their sheathing leaves and albuminous seed; *Ranunculaceæ* also agree to the same extent and are therefore relations, but somewhat distant; the same may be said of the Spermacoceous section of *Rubiaceæ*, but still all are widely distinct. Ranunculaceæ is, perhaps, that which approaches the nearest in some points, and *Aralaceæ* in others.

HYDROCOTYLE.

Calyx-tube slightly compressed; limb with the margin obsolete. Petals ovate, entire, acute, spreading, their apex straight. Fruit laterally compressed and flattened. Merricarps without vittæ: primary ridges 5, filiform, the dorsal and lateral ones often obsolete, the intermediate ones enlarged. Seed carinately compressed.—Herbaceous or rarely suffrutescent plants, usually slender and aquatic. Umbels simple. Involucre few-leaved. Flowers sessile or pedicelled, whitish.—*W. and A. Prod. p.* 366.

The plants of this genus as the name implies, generally frequent low, wet or marshy grounds, and where they do occur are generally very abundant. On the Hills they are frequent in damp shady woods. Four species are indigenous; in them, two frequenting the open grounds, and two more shady woods. They are procumbent straggling plants, the most erect of the set being the one I have selected for representation. It grows with great luxuriance in dark shady woods, in low, wet soil. In such woods about Pycarah and the Avalanche, I have often seen it; I do not, however, recollect finding it about Ootacamund, though I dare say, it is also to be found in the woods here.

Hydrocotyle polycephala (W. and A.:) stems rooting, scabrous or nearly glabrous; branches petioles and peduncles, and the leaves sparingly, on both sides, scabrous from short stout hairs: leaves attached by the margin, orbicular-reniform, 7-lobed; lobes scarcely acute, coarsely crenated: peduncles hoary, numerous (6-18) and umbellate in the axil of the uppermost shortly petioled leaf, almost as long as the leaf: flowers all fertile, numerous (20-30 together), at first capitate and almost sessile, afterwards (in fruit) on short glabrous somewhat permanent pedicels: fruit didymous, slightly 2-ribbed on each side, smooth and flat between the ribs.—*W. and A. Prod. p.* 366.

Frequent in low-lying woods in rich moist soil; in such situations very luxuriant, completely covering large patches of ground; I have found it in many and distant stations in similar situations, both on the Continent and Ceylon. The specimen figured was found at Hullikul, on Mr. Lascelles' estate, where it grew in great abundance in a wood adjoining his Coffee plantation.

SANICULA.

Calyx-tube echinate; its lobes slightly leafy, persistent. Petals erect, connivent, obovate, with long inflected points. Fruit somewhat globose, terete, not dividing spontaneously. Merricarps densely clothed with hooked prickles, without ridges, with many vittæ. Carpophore indistinct. Seeds semiglobose.—Herbaceous perennial plants. Radicle leaves petioled, palmately lobed; the lobes cunate, incise and toothed towards the apex. Stem naked or sparingly leafy. General umbel with few leaves; leaflets of the involucre few and often lobed: partial one of several rays; the leaflets of the involucel several and entire. Flowers in the same umbel, male, female, or bisexaul.—*W. and A. Prod. p.* 367.

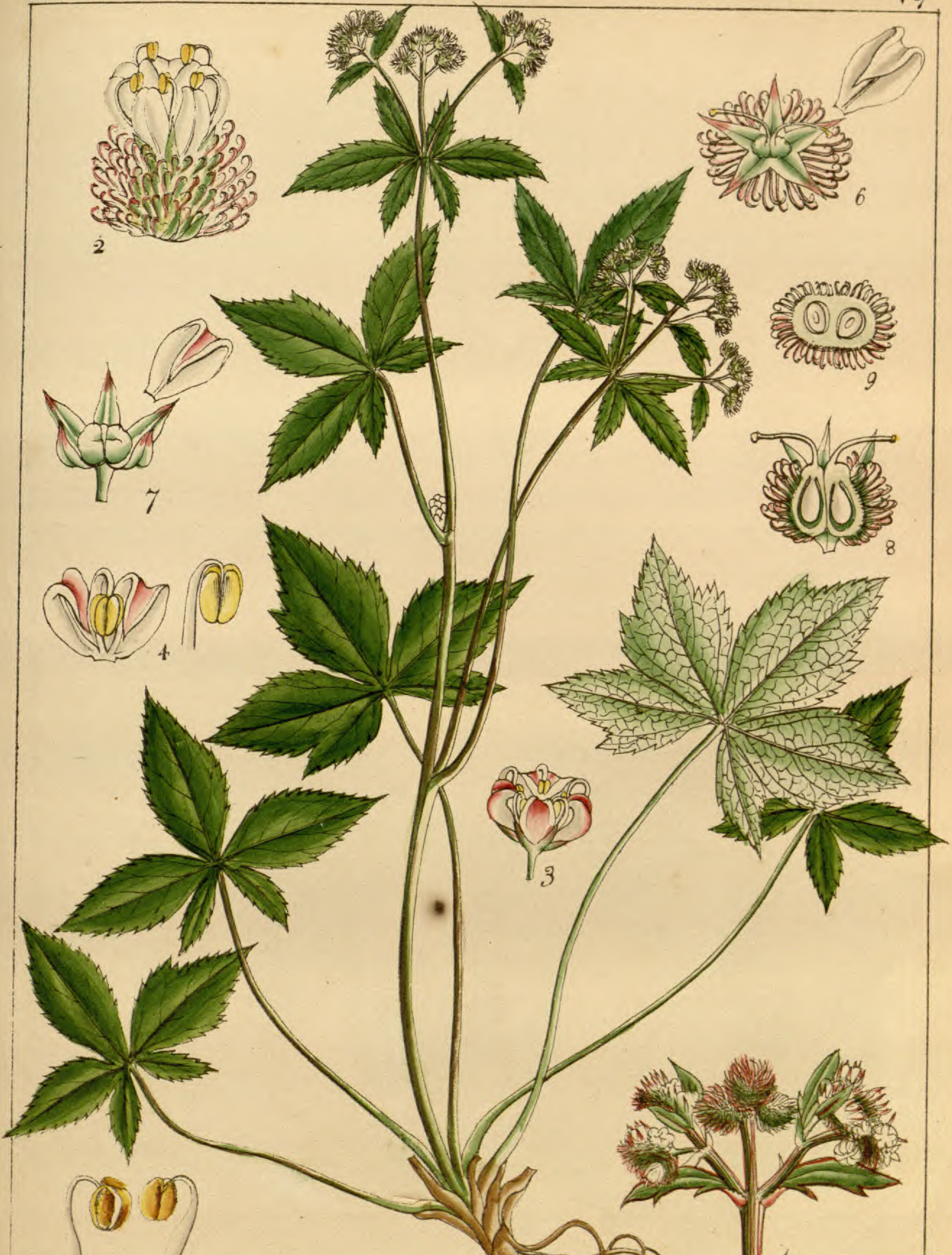
This, like the last, is the only genus of the tribe to which it belongs, found in this part of India. I have introduced it here partly on that account, but principally to show a sport of nature by presenting a plant whose general appearance is so unlike that of other umbelliferous plants, that one, not having a practical acquaintance with the family, might find much difficulty in finding its place in the system of vegetables. It is very abundant in all the woods about Ootacamund and Dodabet, during the rainy season.

Sanicula elata (Ham.:) stem dichotomous at the apex: leaves 3-partite or ternate, glabrous: segments sessile, ovate, acute, lobed and serrated, cuneate at the base, the lateral ones often bipartite: umbels usually 3-fid, few flowered: flowers polygamous, the males pedicelled.—*W. and A. Prod. p.* 367.

An erect growing herbaceous plant, common in almost every wood about Ootacamund, flowering during the rainy season. It often attains a large size, three or four feet in height.

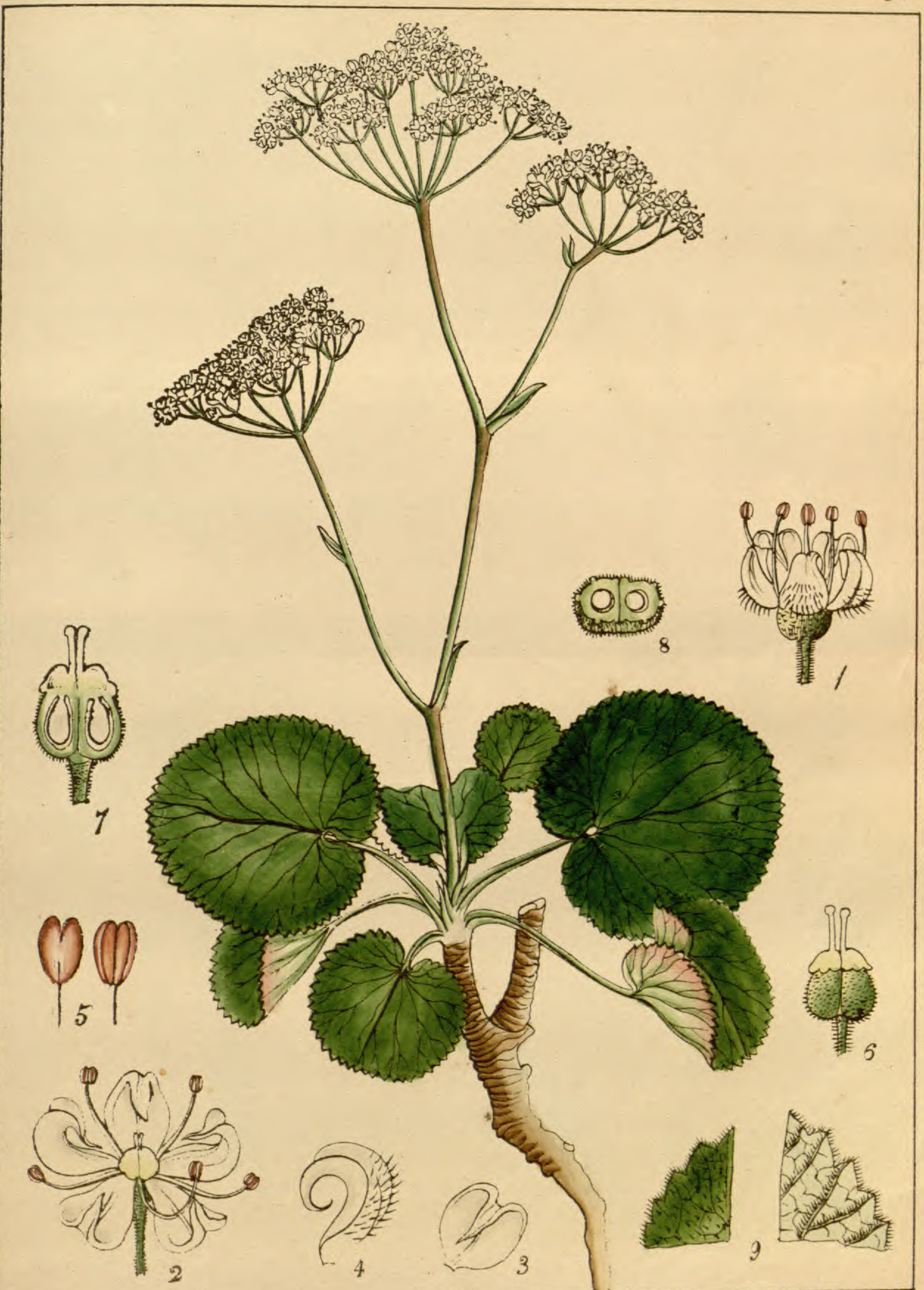
Rungiah del. Dumphy, lith.

Hydrocotyle polycephala (W&A)



Rungiah del. Dumphy, Lith.

Sanicula elata (Wam)



Ragiah, del Dumphy, Lith

Pimpinella Leschenaultii (D.C.)

Rungiah del. Dunphy Lith.

Bupleurum ramosissimum (W. & A.)

PIMPINELLA.

Margin of the calyx obsolete. Petals obovate, emarginate, with the point long and inflexed. Fruit contracted laterally, ovate. Stylopodium cushion-shaped. Styles generally inflexed, sometimes straight, somewhat capitate at the apex. Merricarps with 5 equal filiform ridges, the lateral ones marginal. Interstices with many vittæ, Carpophore bifid. Seed gibbous-convex, flattish in front.—Herbaceous plants with simple roots. Radical leaves either pinnated, or entire : stem leaves more finely divided. Umbels general and partial with many rays, without involucres or involucels, or very rarely with them. Petals white, more rarely reddish or yellow.—*W. and A. Prod. p.* 368.

There are only two species of this genus natives of the Hills; one having an involucrum, or ray of subulate leaves round the base of the umbel, the other without. The one here represented is the one with naked umbels, a mark by which it is easily distinguished from the other. It is very common in the pastures on the slopes of the Hills all about Ootacamund, and readily recognized by its umbels of small white flowers, and two or three round radical leaves lying flat on the ground.

PIMPINELLA LESCHENAULTII (DC. :) perennial : stem slightly branched, glabrous or minutely pubescent : radical leaves petioled, orbicular, cordate, entire, toothed, firm and hard, many nerved at the base, glabrous on the upper side, pubescent on the under; cauline ones few, divided, small and almost reduced to the sheaths : umbel with 5-10 pubescent rays : partial ones with many rays : involucres and involucels wanting : style diverging : fruit ovate-acuminated glabrous.—*W. and A. Prod. p.* 369.

A low herbaceous plant seldom exceeding 12 or 15 inches in height. It is generally distributed over the higher ranges of the hills in dry pastures, flowering during the rainy season. From the naked exposed situations in which it usually grows, though in itself little striking, it becomes very conspicuous. The roots are perennial and strike deep into the soil.

BUPLEURUM.

Margin of the calyx obsolete. Petals roundish, entire, with the closely involute point broad and retuse. Fruit laterally compressed or somewhat didymous, crowned with the depressed stylopodium. Ridges of the merricarps 5, equal, either winged, sharp, filiform, or obsolete : the lateral ones marginal. Interstices with or without vittæ, smooth or granulated. Seed teretely convex, flattish in front.—Herbaceous or shrubby glabrous plants. Leaves rarely divided, usually from the abortion of the limb and dilatation of the petiole changed into phyllodia with quite entire margins. Umbels compound. Involucres various. Flowers yellow.

Of this genus, including in all about 70 species, four are found on the Hills. They are remarkable in the family for their simple undivided leaves, a mark by which the genus is generally much more readily distinguished than by those taken from the flowers and fruit. The one here represented is by far the most common and most conspicuous from its size, and very numerous umbels of small yellow flowers with which it is covered. All along the roads from both Kotagherry and Coonoor, it abounds, often attaining a height when supported by bushes among which it grows, of seven or eight feet, forming a strong contrast with another found in open pasture grounds which rarely exceeds as many inches. A third species I have found in several places of much larger growth, having stems several inches in circumference, and the lower leaves of the stems sometimes 7 or 8 inches long and about 1½ broad. That species *B. plantaginifolium.* R. W. Icones.—Occurs in woods on Elk Hill, at the bottom of Kaitie Falls, and on Snowdown.

BUPLEURUM RAMOSISSIMUM (W. and A. :) perennial, diffuse and much branched, leaves oblong-linear, with a long mucro, narrowed towards the base, amplexicaul, 5-9 nerved, between coriaceous and membranaceous : general umbels with 5-8 rays ; partial with 8-12 flowers : leaflets of the involucre and involucel about 5, oblong-linear, mucronate ; the former 2-3 times shorter than the rays ; the latter rather longer than the flowers, shorter than the fruit : fruit about a half longer than the pedicels, strongly ribbed ; interstices with 1-2 vittæ.—*W. and A. Prod. p.* 370.

A very large ramous diffuse species, very common on the Hills, generally found growing among bushes in moist soil, usually from 4 to 6 feet high, but often greatly exceeding that size—Flowering during the rainy season. The flowers are small yellow,

the fruit elongated, somewhat curved like Caraway seed, when ripe marked with strong longitudinal ribs. It is well named *ramosissimum*, but of *mucronatum*, seems equally appropriate, and after comparing many specimens in all states and forms, I am now satisfied that one of these species must be reduced. *B. virgatum* seems also too nearly allied to these.

PASTINACA.

Margin of the calyx obsolete or minutely toothed. Petals roundish, entire, involute, the involute part broad and retuse. Fruit flat-compressed dorsally, surrounded by a dilated flattened margin. Merricarps with very slender ridges; the dorsal and 2 intermediate ones equidistant, the lateral contiguous to the dilated margin. Vittæ linear, scarcely shorter than the ridges, solitary in each interstice, 2 or more on the commissura. Carpophore bipartite. Seed flattened.—Herbaceous plants with a fusiform and often fleshy root. Leaves pinnated, the segments toothed, cut or lobed. Umbel compound. Involucre and involucel wanting or few-leaved. Flowers usually yellow.—*W. and A. Prod. p.* 372.

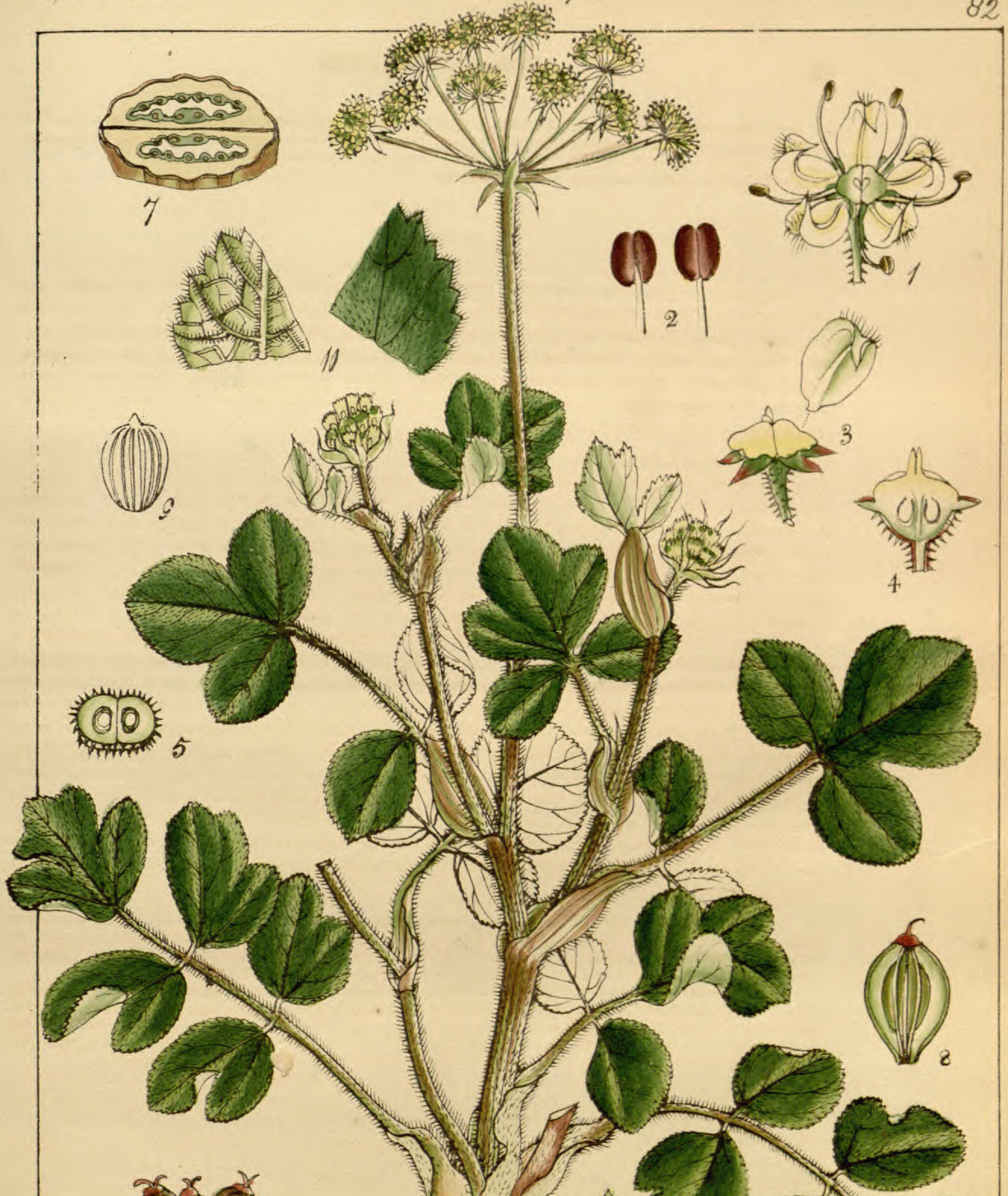
The well known Parsnip is a member of this genus. It is one of very old date being originally established by Tournifort. Since his time another genus has been formed and adopted by all Botanists, from Linnaus downwards, under the name of *Heracleum*, which, however, so far as I can discover, only differs in one point, the form of the petals. In this they are said to be roundish, entire, involute, the involute part round and retuse—while in the other they are said to be obovate, emarginate, with the point inflexed, the exterior ones often larger, spreading and bifid. To my mind these distinctions are too slight and indefinite to merit the importance assigned to them, at least as regards the Indian species. Under this impression, I have taken the liberty of uniting the Indian *Heracleums* with *Pastinaca*, and now publish the *H. rigens* of our Prodromus as a *Pastinaca*, by which two very artificial genera are united into one very natural one. Of the united genera there are several species on the Hills, all distinguished by their coarse foliage, and more or less compressed winged seed. So long as they were separate I always found it exceedingly difficult to tell one genus from the other, united they are generically easily recognized, though the species are not always quite so easily made out. They are all common during the rainy season, but disappear after having produced their seed. I republish from my Icones No. 1010, the following brief remarks regarding the union of the two genera. Being unable to discover any characters, by which these species and several others in my collection, may be distinguished generically from *Pastinaca*, the older genus of the two, I have been induced to refer them all to that genus in preference to retaining both it and *Heracleum* in the Indian Flora. It is my impression that there is no difference between the two genera, but I leave that for those who have better means of determining the point, to decide. So far as written characters go there is no difference, but there may be in habit, with which I am unacquainted.

PASTINACA RIGENS (R. W. *Heracleum rigens* Wall D. C. W. and A.) stems slightly branched, furrowed, pubescent or hirsute: leaves ternate; divisions roundish, somewhat cordate at the base, toothed, upper side more or less scabrous with short hairs, under densely pubescent or tomentose, lateral ones on a short, terminal one on a long petiole, the latter bluntly 3-lobed or ternate; leaflets of the involucel ovate: petals equal: fruit ovate; vittæ on the back linear, much shorter than the fruit, the lateral ones in pairs, and close to the intermediate ridges: vittæ on the commissura 4, acute, unequal, the two outer the shorter.—*W. and A. Prod. p.* 373.

Frequent in pastures, flowering during the rainy autumnal months. The radical leaves are usually pinnated and lie on the ground. The specimen selected for representation is a small one, but as compared with many of the others, this is a small species.

XXXIII.—ARALIACEÆ.

To this order the Ivy *(Hedera Helex)* belongs, and though on these hills we have nothing at all like the true Ivy to recall the fondly cherished associations of our native land; we have several species of the same genus and with them the aid of a name, though the things are most unlike, to make us think of the Ivy clad towers and trees of the old country. The Ivies of India are certainly most unlike those of Europe, but not more so than we find in



Rung ch. del. Dunphy, Lith.

Pastinaca rigens (R.W.)
Heracleum rigens (Wall W. & A.)

other genera. In Ceylon there is a species of fig that so perfectly associates in habit with Ivy, that any person not knowing the difference would almost suppose, on seeing a wall or trunk of a venerable tree covered with it, that he was looking on genuine Ivy.

The difference between that Ivy-like Fig and our stately Banyan tree, is therefore greater than that between the European and Hill Ivies; for even the most arboreous forms of the Hill Ivy when growing along side of another tree or cleft of rock, have a tendency to seek support from it. Both the trees here delineated show that disposition.

This is a widely diffused family, and in proportion to the number of species, India has perhaps the largest proportion, there being about 60 Indian species out of about 200, the remainder being distributed over China, the Eastern Islands, Madagascar, Mauritius, America and Europe. Of that number the Neilgherries furnish a list of no fewer than 8 species, (exclusive of one reduced,) with which I am acquainted, and probably more may yet be found when more carefully explored. All these I refer to the genus *Hedera,* not thinking the genus *Paratropia,* D. C. under which part of them are described in our Prodromus, sufficiently distinguished. They are all more or less arboreous, the wood in all is soft, brittle and very juicy, the juice having a peculiar terebenthine odour when first exuded. The leaves in all are compound pinnate or palmated. The flowers in umbels, the fruit baccate, generally small, about the size of peas.

The nearest relations of this order are evidently *Umbelliferæ* and *Ampelideæ,* but both so widely separated that there seems little chance of any of them being confounded, though all agreeing in some important points.

Regarding properties little can be said, none of those on the Hills so far as I have yet heard, are turned to any useful account; but the Chinese Gensing, a medicine in prodigious repute among the Celestials, is obtained from a plant of this family. Its medicinal properties are perhaps somewhat exaggerated among them, but must have some foundation in truth, otherwise it never could have acquired and maintained the high esteem in which it is held by them.

HEDERA. *Ivy.*

Margin of the calyx elevated or toothed. Petals 5-10, distinct, or cohering at the apex, and falling off like a calyptra. Stamens 5-10. Styles as many as the petals rarely only 4, converging or combined into 1. Berry with as many cells as there are styles.—Climbing or erect shrubs, or trees. Leaves simple or compound. Flowers umbelled or capitate.—*W. and A. Prod. p.* 376.

Between this genus and *Paratropia,* and some others of this family, I can see no difference in the organs of fructification, the real distinction being one of habit. In both the leaves are compound, but in *Hedera* they are pinnate, in *Paratropia* digitate. This difference in my estimation not forming a generic distinction, I have no hesitation in uniting them. According to that difference both the species here represented are Paratropias, and the name having been already established, I shall so far keep it up as to employ it as a sectional distinction. All the Hill species I have seen are arboreous; one, *H. racemosa,* attains a large size, the others are for the most part ramous from the base, and partake more of the character of large shrubs than trees. *H. obovate* frequents somewhat lower levels, such as about Coonoor. *H. racemosa* is met with in the woods about Ootacamund, but sparingly.

In our Prodromus it is remarked that *Paratropia* appears a natural genus, having the leaves digitate and umbels of flowers arranged in racemes forming thyrses, &c., being now impressed with conviction that, so

far as characters derived from the fructification are concerned, no generic difference exists between *Hedera* and *Paratropia*, I have referred all the species of the latter to the former genus, but have retained the latter as a very natural and characteristic subgenus, on account of their digitate leaves and thrysoid inflorescence; these, in the absence of structural difference of the reproductive organs, not being held of sufficient weight to entitle them to generic value.

HEDERA (P.) OBOVATA (R. W.) arboreous, glabrous, leaves digitate; leaflets about 5, petioled, cuniate, very obtuse or sometimes obcordate, coriaceous: thyrses numerous, aggregate towards the ends of the branches, ebractiate: umbels numerous, solitary on each peduncle: flowers pedicelled: petals, stamens and stigmas eight, rarely six, ovary 8, rarely 6-celled.

A rather widely distributed tree, of small size, occurring in alpine jungles. I have specimens from Courtallum; Shevagherry Hills; Hills near Coimbatore, and from the jungles about Coonoor. One on the right hand side of the road, going down about 100 yards below the 2-mile-stone, furnished the specimen figured, where it flowers during April and May. The octonary fructification at once distinguishes this from all the other species here, independently of the remarkable foliage.

HEDERA (P.) RACEMOSA (R. W.) arboreous, leaves digitate: leaflets about 7, form oblong, lanceolate acuminated, undulate on the margin, to elliptic cuspidate: thyrses panicled, usually lateral, (from the previous year's wood,) branches racemose, flowers pedicelled, furnished at the base of the pedicel with a small somewhat subulate bractea: petals and stamens 5, styles 5 short: stigmas distinct obtuse: fruit 5-celled.

A large tree of rather rare occurrence. A few fine trees 70 or 80 feet high, and large in proportion are growing in the woods behind Kelso land in Ootacamund. I have met with it in several other places, but no where abundant. The very peculiar inflorescence at once distinguishes it from the rest of the genus. The leaflets vary a good deal in form and size: in some of my specimens they are scarcely waved nearly elliptic, with a short cuspidate point, under 4 inches long, and 1½ broad, in others they are 6 or 7 inches long and about 2 broad; much waved. Flowers June and July. The mature fruit scarcely attains the size of a moderate sized pea.

XXXIV.—LORANTHACEÆ—*Mistletoe Tribe.*

This is a most curious family of (with one exception,) tree parasites. The species are very numerous, but the genera very few. They are always found growing on other plants commonly on branches of trees, but not unfrequently on each other, and I have even seen examples of a new plant parasitic on its own parent. DeCandolle remarks that they grow on nearly all kinds of trees except milky ones. This remark is according to my own observations generally true, but not without striking exceptions, as I have seen them quite abundant on Fig trees, and one *Loranth. Euphorbeæ* R. W. on our milk-hedge *(Euphorbia Antiquorum.)* The family generally most abounds within the tropics, or in the warm regions of the temperate zone, only two species being natives of Europe; but on these hills, with a temperate climate, they are very numerous, Viscums and Loranthi being found every where, scarcely a tree to be met with being constantly free from their visitation, and among them are some very beautiful species. This last remark applies exclusively to *Loranthus*, the species of *Viscum*, though some are very curious, have no beauty to recommend them to our notice; but are not on that account the less deserving of observation, owing to the contrast which they present in habit and appearance, to the tree that supports them, and from which they extract their nourishment.

The species growing on milky plants show clearly that they have the power of elimenation, and can select such portion of the juices only, as are suitable for their nourishment, their own juices being watery, while those of the supporting plant are milky, an interesting fact in the history of these vegetables.

The floral structure of this family furnishes an example of the difficulties which occasionally present themselves, as if, to set at nought classification of the vegetable kingdom,

Rungiah del. Dunphy Lith.

Hedera obovata (R. W.)

Hedera racimosa (R.W.)

resting on the assumed uniformity of those organs. Polypetalous flowered families are grouped together in one series; monopetalous ones in another, and apetalous in a third: in this order the three meet—*Viscum* is polypetalous, *Loranthus* monopetalous, *Misodendron* apetalous, and as if that were not enough, we find in Viscum the first and last combined, the male flowers being apetalous, and the female ones polypetalous.

Jussieu's and DeCandolle's systems are based on the structure of the flowers, Polypetalous, Monopetalous and Apetalous flowers, forming their primary subclasses. Such being the case, it is not to be wondered at that much discrepancy of opinion exists among Botanists, as to the place this family should occupy. By most of the Botanists of the present day, it has been placed among monopetalous orders, mainly I believe, on account of the perfect corolla of *Loranthus,* the most prominent genus of the order.

Brown, however, with his usual farsighted discrimination, long ago decided that their proper place is near *Proteaceæ,* an apetalous family; an opinion which is gradually gaining ground, as our acquaintance with Thymalaceous orders enlarges, and must ere long be universally adopted, as there can be no doubt that the nearest relations of the family are to be found in that subclass. *Proteaceæ, Olacineæ, Thymaleæ* and *Santalaceæ,* are all more nearly allied families than any of those among which they are now generally placed, and all belong to that division of the vegetable kingdom.

Viewed in connection with these families this is a most instructive one, as regards existing systems of natural classification of plants, as tending to show that hitherto, probably, too much importance has been attached to the form, perfection and relative position of the flower, and scarcely enough on the ovarium and its contents; as it is similarity of the latter that furnishes the bond of union by which the genera associated in this family, are held together, notwithstanding the wide discrepancy among their flowers.

Another circumstance may be mentioned, as incidentally tending to confirm the relationship existing between this order and those mentioned above; namely, that DeCandolle has placed the genus of *Schoepfia* among *Loranthaceæ,* while Mr. Bentham a Botanist of the highest attainments, has referred it to *Olacineæ,* an order, on the affinities of which I have already offered some remarks, tending to show that it is erroneously placed by DeCandolle and his followers, on characters taken from the flowers, but not confirmed by the ovarium and fruit.

I have mentioned at the commencement of these remarks, that the species of this order are "true parasites," that is, they send their roots into the substance of, and draw their nourishment from the proper juices of the plant that bears them. In this respect they are unlike epiphites; that is, plants that simply adhere to the bark, but do not penetrate into the substance of the plant. Of this description are numerous *Orchideæ,* and *Mosses* which are nourished by moisture obtained from the atmosphere, and retained by the rough and porous bark of the trees on which they grow.

The process of vegetation can be easily observed, probably in all kinds of Loranthaceæ, but certainly in numerous species of Loranthus; all that is required being to take mature seed, and stick them by their viscum on any substance. In due time the radicle shoots from one end, becomes curved, swells and dilates at the apex, and attaches itself to

the body on which the seed adheres. If that body be a suitable one for its support, a growing plant for example, a radicle in due time issues from the dilated sucker-like portion, penetrates the bark, and extends itself on the wood below. I have seen seed in a state of vegetation on leaves, stones, and in short anywhere, but of course they can only take root when their support is of a kind to admit of it.

The plants of this family abound in the substance familiarly known under the name of, "Birdlime" or viscum. The Mistletoe, the European representative of this family, is well known, at least by name, on account of the superstitious traditions regarding it, which have been handed down to the present time from those of the Druids, among whom it was venerated as a sacred plant.

VISCUM—MISTLETOE.

Flowers diœcious or monœcious. Calyx with the margin obsolete and entire. Petals 4 (more rarely 3 or 5,) thick, nearly triangular from a broad base, very shortly united at the base into a gamopetalous 4-partite corolla, or distinct, valvate in æstivation. Stamens wanting in the female; in the male without filaments, and with the anthers adnate to the petals, and composed of numerous little cells (or bilocular ?): ovary in the female cohering with the calyx. Stigma almost sessile obtuse. Berry umbilicated, internally mucilaginous. Embryo irregular in its direction, sometimes 2 or 3 in the same seed: extremity of the radicle often (always ?) protruded beyond the albumen,—Parasitical shrubs, growing on dicotyledonous trees, all (with one exception,) glabrous. Branches terete, tetragonal, or compressed, often jointed. Leaves opposite or rarely alternate, often wanting or reduced to a mere scale. Flowers fascicled, or in spikes.

Of this genus there are about 100 known species. They are generally ramous, pendulous plants, the branches jointed, bearing the leaves and flowers on the joints, the flowers are very minute, and often in the leafy species, required to be looked for before they can be seen. The fruit is usually an oval, pulpy berry, frequently red, when ripe the seed is enveloped in a very visced muscilaginous substance, by which, they adhere to whatever they touch, and if the circumstances are favourable, vegetate.

In this way they might be easily propagated. The species of this genus have but little in their appearance to recommend them, hence, except as curiosities, they are not worth the trouble. Not so however many of the species of Loranthus, which are indeed very beautiful plants, and might, I think, be easily turned to account for ornamental purposes.

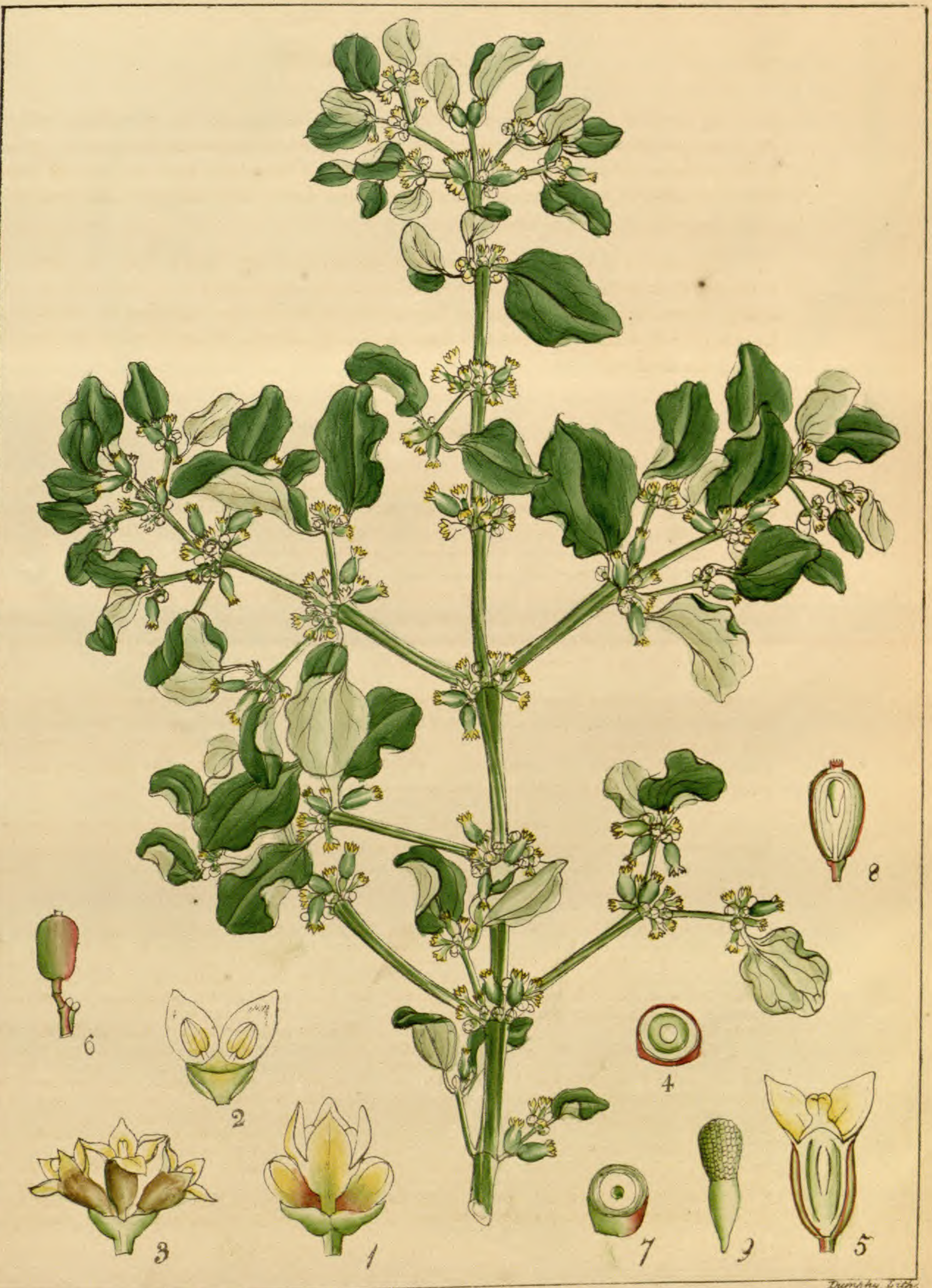
Viscum orbiculatum (R. W.) monoicous, branches four sided, angled: leaves opposite, orbicular, much waved on the margin, slightly 3-5 nerved: flowers sessile, axillary, aggregated, male and female mixed: anthers sessile on the lobes of the calyx, flat, composed of numerous little cells, berries oval, oblong, obtuse at both ends.

A very rare shrub; the plants from which the drawing was made being the only ones I have seen; they were growing on the branches of *Agapetes arborea*. The draftsman has not correctly represented the anthers, the other parts of the figure are unexceptionable.

Viscum moniliforme (Blume) leafless: stems terete at the base; branches opposite or fascicled, compressed: articulations obovate-oblong, tapering at the base, 3-4 times longer than broad, costate along the middle but not striated: flowers sessile at the apex of the joints, opposite or in opposite fascicles of 3 together, sometimes nearly verticillate.—*W. and A. Prod p.* 380.

This unlike the preceding, a widely distributed plant, and is found on all kinds of trees, the specimen here given, grew on the *Rhododendron arboreum*, a portion of which accompanies.

Viscum Moniliforme β *croaloides* (R. W.) This variety occurs in the most profuse abundance on the hills, frequenting nearly all kinds of trees and shrubs, but is probably most frequent on a species of *Ilix*. The specimen from which the drawing was taken, grew on a species of *Agapetes*, on the banks of the Pycarah River. This variety seems quite diœcious; but I have never met with a male plant among hundreds that I have examined. Judging from the specimen figured, it might well be considered a distinct species, but extended examination of the plant in all its forms, scarcely warrants its separation from the preceding.



Rungiah, del. Dunphy, Lith.

Viscum orbiculatum

Rungiah, del.

Dumphy, Lith.

Viscum moniliforme (D.C.)

Rungiah, del. Dumphy, Lith.

Loranthus Neilgherrensis.

LORANTHUS.

Flowers usually bisexaul. Calyx-tube ovate, rarely turbinate : limb short, truncated or toothed. Petals 4-8, usually 5-6, either distinct or more or less united : æstivation valvular. Stamens as many as the petals and opposite to them : filaments adnate to the base of the petals, free at the apex : anthers 2-celled, adnate, or erect, or versatile. Style filiform. Stigma simple, capitate or turbinate. Berry roundish, ovate, or oblong, or turbinate, 1-celled, 1-seeded, usually crowned with the limb of the calyx. Shrubs usually parasitical, rarely growing on the ground. Leaves opposite or alternate, entire, usually thick and coriaceous. Flowers spiked, or racemose, or panicled.

The Neilgherry species of this genus are numerous and individually abundant. How many species there may be is very doubtful, but my impression is, that as many as 20 are natives of these Hills, though I have not yet collected so many. Every wood about the Hills abounds with them, and scarcely a tree grows but is subject to their attacks. In their general appearance they greatly vary ; some are stout, erect growing shrubs, some slender, twiggy and pendulous, some with bright foliage, at first of the richest crimson tints, while others are of the most dull and unassuming. The colour and appearance of the flowers equally vary ; some are large and richly coloured, others smaller, but still conspicuous for the richness of their colouring ; while others are the dullest imaginable, and as if to conceal the little colour they have, are clothed with dirty whitish or tawny coloured hairs. Many attain a great size, and by their drain on the vital fluids of their support, speedily induce the premature decay consequent on deficient nourishment.

Loranthus Neilgerrensis, (W. and A. :) glabrous : branches terete, young ones obscurely and bluntly angled : leaves alternate, elliptic-oblong, shortly petioled, thick and somewhat fleshy, ultimate one of the branch (always ?) orbicular ovate : peduncles axillary, aggregated, very short, about the length of the petiole, bearing an umbel of 3-7, very shortly pedicelled flowers : bractea solitary under the ovary and close to it, lateral, ovate : margin of the calyx obscurely repand toothed : corolla glabrous, ventricosely gibbous at the base, equally 5-cleft to beyond the middle : segments cuneate linear, recurved.—*W. and A. Prod. p.* 382.

This is a fine species of great size, and when in perfection, most conspicuous from its numerous deep red, almost crimson coloured flowers, which completely cover the branches, while the young leaves on the new shoots, are also often deep red.

XXXV.—CAPRIFOLIACEÆ—HONEYSUCKLE TRIBE.

This is a small, but to the Horticultural Amateur, an interesting family, as including within its narrow limits the Elder, the Honeysuckle, the Tinus and Lauristinus, Guelder, Rose, and numerous other ornaments of the shrubbery and arbour. They are the more esteemed as, being for the most part natives of temperate climates, they are hardy enough to bear the winters of England. In its geographical distribution this family occupies a wide range, extending from Lapland within the arctic circle, where *Linnæa borialis* is indigenous to New Zealand, nearly 50° South of the equator, the native country of the genus *Alseuosmia*; and all round the world from the Western shores of America, to the Eastern ones of China and Japan. But while thus extensively inhabiting the temperate regions of both hemispheres, they are of rare occurrence within the tropics; except where, as in the instance of these mountains, local circumstances produce a temperate climate.

In Nepaul and the Hymalayas generally, they are numerous; upwards of 20 species being described from the valley of Nepaul alone; thence they extend Southward to Ceylon, and Eastward to Japan. On the Neilgherries 6 species are indigenous, two of *Lonicera*, and four of *Viburnum*: thereby indicating by their vegetable productions, the extra-tropical character of the climate of these Hills.

The order itself, in its Botanical characters, is one of great simplicity, being quinary in all its parts except the ovary, which is usually 3-celled or, in other words, made up of 3 united carpels, each cell usually containing several ovules. I have however specimens of *Lonicera Leschenaultii*, (the common Hill Honeysuckle,) with four and five celled fruit; this however is a rare and accidental variation probably depending on some local cause.

Three carpels, with several ovules in each, is the usual number in *Lonicera*, and most of the other genera; but *Viburnum* departs widely from the character of the order in that respect, as I find, in all the species I have examined, upwards of 20 in number; it has constantly a solitary carpel with a single ovule pendulous from the apex of the cell. Thinking this structure limited to the Neilgherry species, my first thought was to remove them from the rest of the genus, which nearly all modern Botanists describe in such a way, as either to lead to the inference, that it has a plurality of cells and ovules, or actually assert, that such is its structure; and had I not possessed specimens of two common European species which agreed in structure with our Indian ones, I would undoubtedly have acted on my first impressions, on the supposition that the Indian members of the family had been referred to it on external appearances only, without sufficient examination; and as affording a striking illustration of the importance of Geographical distribution in the limitation of genera. The case however as it now stands, is less creditable to the leaders of the science in Europe, than I at first supposed.

The affinities of this order need not be dwelt upon: it is evidently most nearly related to *Rubiaceæ*, from which indeed it scarcely differs except in the want of interpetiolar stipules, a character of great importance as being the only invariable bond of union by which the large assemblage of plants, congregated under that family, are held together. In one tribe hitherto associated with Rubiaceæ, they are wanting or doubtful, and that has, by Dr. Lindley, been removed from them as a distinct order, under the name of *Stellatæ*. The peculiar structure of the ovary of *Viburnum*, furnishes a connecting link with *Loranthaceæ*, not previously suspected, an order in other respects far removed.

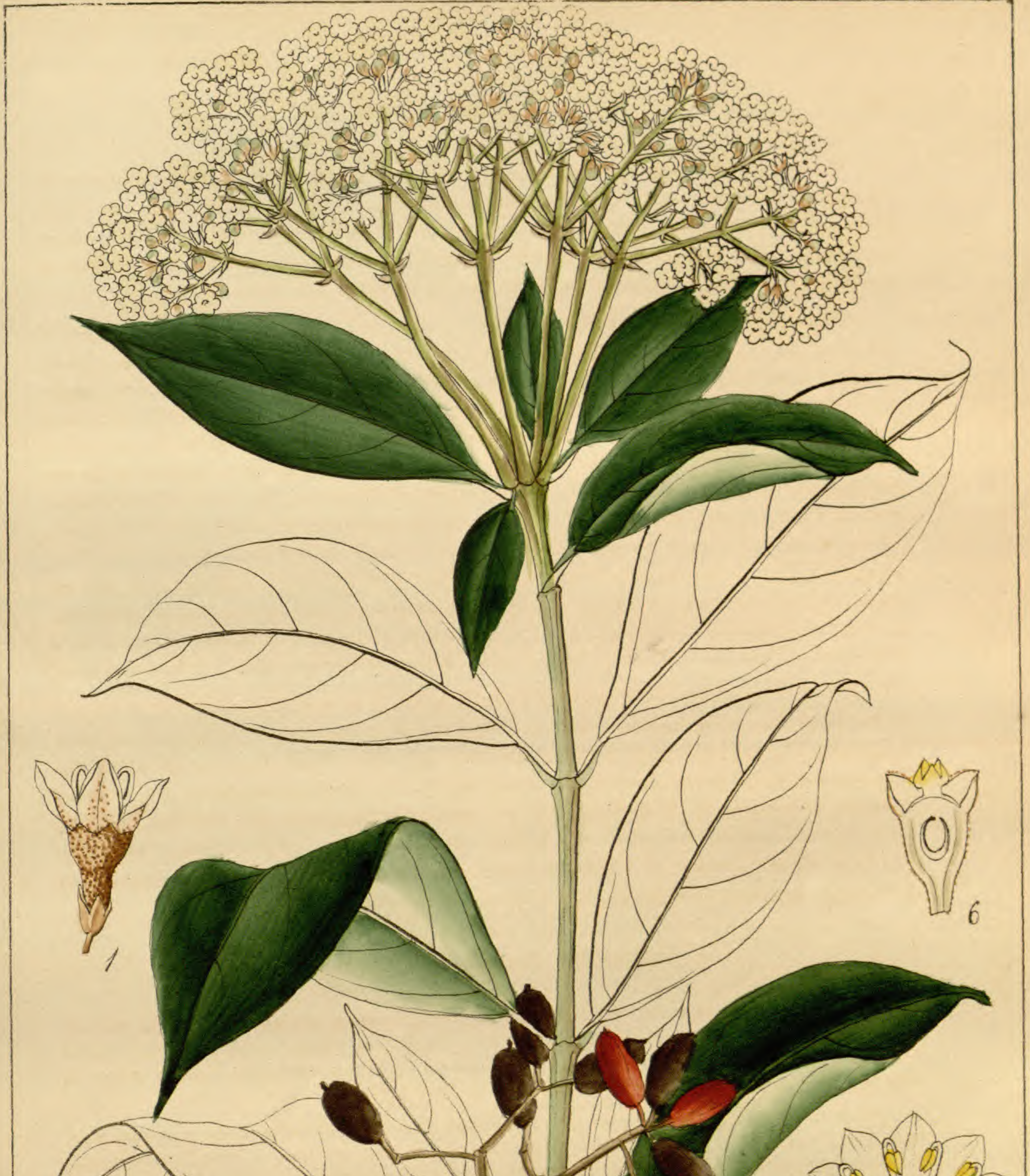
VIBURNUM. Guelder Rose, Lauristinus.

Limb of the calyx small, 5-cleft, persistent. Corolla rotate, somewhat campanulate, or tubular, 5-lobed. Stamens 5, equal. Style none or short. Stigmas 3. Berry by abortion 1-seeded, ovate or globose, crowned with the teeth of the calyx. Seed compressed.—Shrubs. Leaves opposite, petioled, entire or lobed. Corymbs terminal. Flowers white, or slightly reddish.—*W. and A. Prod. p.* 388.

This is an extensive genus consisting for the most part of handsome flowering shrubs with some small trees, I am not aware of any of large dimensions; several of the species are much cultivated as ornamental shrubs, and are prised on account of their property of flowering late in autumn or winter, when other flowers are not to be had. According to the most recent enumeration, the genus includes nearly 70 species, natives of Europe, Asia and America. Among the Asiatic species several are from China and Japan, and four are natives of the Neilgherries; a 5th, *V. pubigerum* described in our Prodromus, I have since ascertained to be an imperfect specimen of *V. Wightianum*.

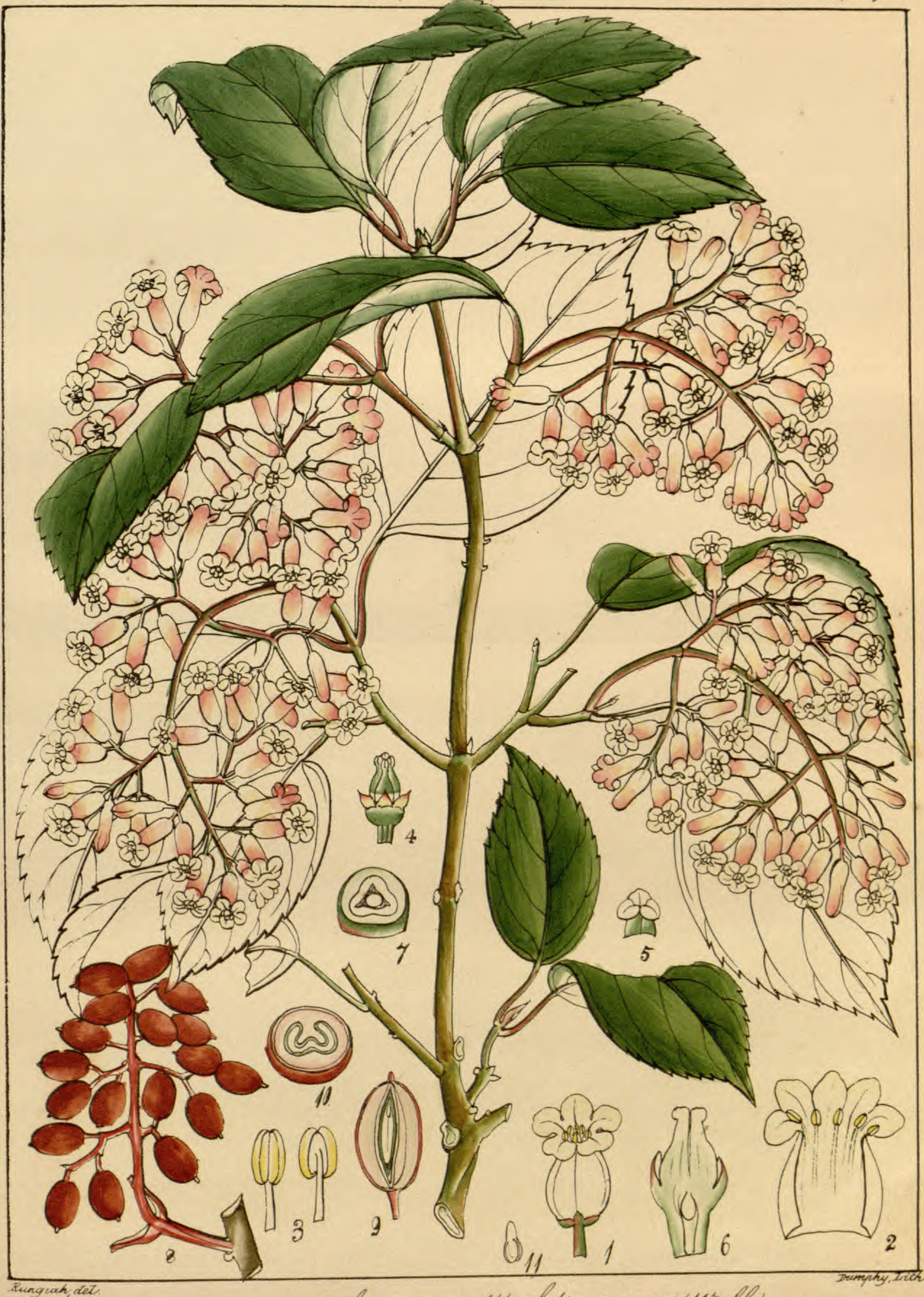
These are all handsome flowering shrubs generally meriting a place in gardens, though their claims to this distinction are, as will be seen from the plates, very unequal.

In the above genuine character which is copied from DeCandolle, and adopted in our Prodromus, the fruit is said to be a "*berry by abortion* one-seeded." This is a mistake: it is one-seeded, but not by abortion, as the analysis of the ovary of all the species will show that the ovary contains only one ovule, consequently no abortion can have taken place when that one comes to maturity.



Rungiah, del. Dunphy, Lith.

Viburnum acuminatum (Wall)



Rungiah, del. Dumphy, lith.

Viburnum Wightianum (Wall)

DeCandolle divides the genus into three sections—Lentago, Opulus and Solenotinus. To the first we have referred *V. acuminatum* and *capitellatum*; and to the last *V. hebanthum* and *Wightianum* if in this distribution we are correct, these two sections must indeed be very arbitrary and quite inapplicable in practice, as I have never yet been able to apply them: the error, however, may be ours, not his, as none of our species are described by him.

VIBURNUM ACUMINATUM, (Wall:) young branches, petioles, and peduncles dotted with small rusty-coloured scales: leaves elliptical, acuminated at both ends, coriaceous, quite entire with margin slightly recurved, glabrous: upper side shining, under covered with minute shining rusty coloured dots: cormyb terminal, large, trichotomous, often larger than the leaves: stigmas sessile: berry oval-oblong.—*W. and A. Prod. p.* 388.

A common and widely distributed species; but rarely, if ever met with at the elevation of Ootacamund: at Coonoor and for two or three miles below that place, it is very common and when in flower, a very handsome shrub. I have specimens from several other alpine stations, but have never seen it under three or four thousand feet of elevation.

In some situations it may almost be called a small tree: generally it is a large ramous shrub.

VIBURNUM CAPITELLATUM, (W. and A.:) free from scales, quite glabrous except in the axils of the nerves: leaves oval-lanceolate, with a few distant wavy teeth, attenuated at the apex into a rather fine point, under side with the axils of the nerves woolly: cymes compound, somewhat umbel-shaped, 3-6-partite; flowers umbellate, several together, nearly sessile at the extremity of the ultimate divisions: flower-buds viscous and shining: stigmas sessile: berries oval-oblong.—*W. and A. Prod. p.* 388.

The specimens from which the accompanying drawing was made were found in the neighbourhood of Kotagherry. I have other specimens from the Pulny range, found at a nearly similar elevation: but I do not recollect having observed it about Ootacamund. It is a handsome shrub, very nearly allied to the next, but evidently distinct. Flowers during the autumnal months.

VIBURNUM HEBANTHUM, (W. and A.:) branches, petioles, and general peduncles glabrous: leaves elliptical or obovate, shortly acuminated, obtuse or acute at the base, slightly sinuate-toothed on the lower half, coarsely so toward the apex, woolly in the axils of the nerves on the under side, otherwise glabrous: partial peduncles of the cormyb pubescent: corolla tubular campanulate, softly pubescent, limb very small, nearly erect, 4-5 times shorter than the tube: style very short and thick.—*W. and A. Prod. p.* 388.

A very common shrub or small tree, all over the higher ranges of the hills. The specimen from which the figure is taken does not convey a favourable impression of the inflorescence, but can scarcely be said to be unfavourable, as in that respect, it is certainly the least striking of the Neilgherry species. It begins to show its flowers in February, but is not in perfection until March and April.

VIBURNUM WIGHTIANUM, (Wall.:) branches, petioles, peduncles, pedicels and flowers glabrous: leaves oval, shortly acuminated, obtuse at the base, quite entire on the lower half, sharply serrated towards the apex; upper side glabrous; under slightly puberulous when young, nearly glabrous when old, the nerves densely pubescent and their axils woolly: cormyb shortly peduncled, somewhat panicle-shaped: bracteas linear, pubescent and ciliated: corolla hypocrateriform; limb spreading, conspicuous, about 4 times shorter than the tube: ovary linear: style very short and thick.—*W. and A. Prod. p.* 388.

A moderate tree or large shrub frequent in the woods about Ootacamund, flowering in April and May, but generally to be met with at other seasons. The fruit in this, like those of the preceding, is an oval succulent drupe, red and subacid when ripe.

LONICERA—HONEYSUCKLE.

Calyx 5-toothed. Corolla tubular, campanulate, or infundibuliform: the limb 5-cleft, often irregular. Stamens 5. Style filiform. Stigma capitate. Berry 3- (or by abortion sometimes 2-) celled, the cells few-seeded. Seeds crustaceous. Erect or climbing shrubs. Leaves opposite, sometimes connate, entire or occasionally slightly runcinate. Inflorescence axillary, various.—*W. and A. Prod. p.* 389.

Many of the species of this genus, like those of Viburnum, are general favourites as ornamental plants, especially among the lovers of arbours, for the construction of which the trailing habit, and the profusion and fragrance of their flowers admirably adapt them. In regard to the limits of the genus different Botanists have taken very different views. Linnæus combined 4 of Tourniforts genera, in the formation of his genus *Lonicera*. Jussieu took a different view, and divided the Linnean genus into two, *Caprifolium* and *Xylosteon*, thereby obliterating Linnæus' generic name. This division was followed by most Botanists until the publication of the 4th volume of DeCandolle's Prodromus, where he restored the Linnean genus, vastly augmented in the number of its species, though he had himself previously followed Jussieu. Since that time Botanists generally seem to have followed that great authority in reviving *Lonicera* as the generic name, and reducing *Caprifolium* and *Xylosteon* to the rank of subgenera. Lindley, however, in a very recent work of his, "School Botany," still retains the genus *Caprifolium*, as distinct from *Xylosteon* or *Lonicera*, (the name he has by some oversight em-

ployed) though I confess I cannot see upon what grounds, as I cannot help thinking that to keep up both is to retain two most artificial, almost indistinguishable genera; where one most perfect and compact is already formed by nature herself for our acceptance. He, I am aware, upholds the doctrine that excessive analysis is preferable to excessive synthesis; of the truth of which there cannot be a doubt so long as that analysis is based on extensive and careful observation and accurate knowledge of the value of our generic characters; but not otherwise. Loosely constructed verbose characters very analytical in appearance, but quite the reverse when themselves thoroughly analysed, are the bane of natural science: we are too much given to the subdivision of really natural genera on the principle above stated, that excessive analysis is better than excessive synthesis, a principle which, however good in the abstract, can yet be carried too far. Under this conviction it appears to me, DeCandolle has done well to reunite them; as combined, they form a most natural genus, but separated, two very artificial genera.

As it now stands, the genus *Lonicera* includes nearly 70 species drawn from China, Japan, Southern and Northern India, Europe and America: and is divided by D. C. into two sections or subgenera—viz., Caprifolium and Xylosteon, which last is again subdivided into 4 subdivisions; both our Hill species belong to the latter suborder. The plants of which it is composed are only useful for ornamental purposes: forming arbours covering the trunks of a venerable tree, or the face of a wall which it is supposed will look better when richly clothed with luxuriant vegetation than as a naked surface. The one here given, *L. ligustrina* possessing none of the trailing habit which predominates in the genus, is used as a substitute for privit, in the formation of garden fences for which it is well adapted; and is named in accordance, *ligustrum*, being the generic name of the privit.

Lonicera (X) ligustrina, (Wall.) stem somewhat erect and bushy; branches slender, slightly twining, younger ones hairy or pubescent: leaves shortly petioled, ovate-lanceolate, acute, obtuse at the base, quite entire, shining, sprinkled on the margin and when young on the midrib beneath with spreading hairs: peduncles a little longer than the petioles, slightly drooping at the apex, 2-flowered, axillary and solitary: bracteas, a subulate one at the back of each ovary, and one cup-shaped closely surrounding and containing both ovaries: calyx limb constricted in the middle, the margin 5-toothed teeth oblong, short: corolla puberulous, infundibuliform; tube rather short, gibbous on one side at the base; berries distinct, both covered by the common bractea.—*W. and A. Prod. p.* 389.

This is a very common plant about Ootacamund, and like the privit is much used as a fence about gardens for which purpose it answers well, forming a very compact one. The flowers are too small and too few in proportion to the quantity of leaves, to admit of its being considered an ornamental flowering shrub, but so far as general form is concerned, were shrubberies more in vogue on the hills, it would well merit a place in them.

XXXVI.—RUBIACEÆ—Juss.—CINCHONACEÆ—Lind.

In giving names to families, the rule is to select one of the most characteristic genera of the group, and alter the termination of the name by an affix, *ceæ*, being the one usually employed in Botany. Both the above names are constructed on this principle, *Rubiaceæ* being derived from *Rubia*, and *Cinchonaceæ* from *Cinchona*; to this extent therefore, they are both unobjectionable. But the genus Rubia belongs to a small section of the order, and that presenting peculiarities which, in the opinion of Dr. Lindley, justify its separation from the rest of the family and elevation, to the rank of a very distant and well defined natural order. In accordance with this view he gives a new name to the old order, and selecting the well known *Cinchona* (Peruvian Bark,) as the type has, in his natural system, called it *Cinchonaceæ*, appropriating *Stellatæ* or *Galiaceæ*, (from *Galium*) to the new one by which arrangement the confusion apt to originate in appropriating a new meaning to old names, is avoided.

The family even after this division, is still a large and important one, contributing greatly to the comforts of mankind through the powerful medicines (Bark and Ipecacuana,)

Rungiah, del. Dumphy, Lith.

Lonicera (X) ligustrina (Wall)

which it provides, as well as by the grateful and nutritious beverage (coffee,) which it supplies.

Its predilections as regards temperature, are decidedly tropical, or subtropical; not one species—excluding *Stellatæ*—being, so far as I am aware, indigenous even in the South of Europe; while within the tropics they are estimated to constitute 1-29th of the flowering plants. At this rate and assuming that on the higher ranges of these Hills there are 1000 species of flowering plants, which I dare say is near the truth, there should be 38 species of Rubiaceous plants. This, I think, is somewhat beyond the truth, though not much.

This estimate though derived partly from assumed data, for I have never counted the number of species in my hill collections, is I believe very near the truth; and tends to show that this climate partakes more of the tropical character than some of the examples previously noticed would lead us to expect; and that, although an immense improvement on what we have on the plains, we must still look upon it as tropical, and inferior to even the South of Europe, as a temperate region, unless it can be shown, that the temperature is modified in its effects on the constitution by the very rarified atmosphere, requiring a greater volume of air, by probably nearly ¼th, to be respired to yield the same quantity of oxygen to the circulation that would be obtained in a similar temperature on the level of the sea. This is not the place to consider what effect this difference may have in modifying health and disease, though it seems quite in place to advert to the circumstance in connection with facts deduced from a consideration of the natural products of the region.

In a purely Botanical point of view, this is a most interesting family; being in some respects most heterogeneous in its composition, while in others it is one of the best market and most clearly defined, *Compositæ* perhaps excepted, in the system of plants. The question will naturally arise how can such a paradox be explained.

It is clearly defined by its monopetalous corolla, inferior ovary, and opposite leaves with intermediate stipules. The last is, however, the most constant character, and the one by which only it is "strictly limited." We have other orders with monopetalous corollas, inferior ovaries and opposite leaves; but *Cinchonaceæ* alone, are these combined with intermediate stipules, which is in fact the essential character of the order, and in this respect it is most constant; ex-stipulate plants being almost uniformly rejected. It is on the other hand most heterogeneous in the structure of its ovary and fruit. One tribe *Operculariea*, has a one-celled, one-seeded fruit. Another *Spermacoceæ* has a dry 2 or 4-celled fruit, with one seed in each. *Coffeaceæ* has a berried 2-celled fruit, with 1 seed in each. In *Pæderieæ* the two carpels are suspended from the apex of a filiform axis, as in *Umbelliferæ*. *Guettardaceæ* has drupaceous fruit, with from 2 to 10 stones. In all these the cells of the fruit are one-seeded. In *Hamdieæ* the fruit has many cells, and the cells many seed. In *Hedyotideæ*, the fruit are two-celled with many seed in each. In *Gardeniaceæ*, the fruit is one or two-celled indehiscent with numerous parietal seed, while in *Cinchoneæ*, it is a 2-celled capsule with numerous winged seed.

All these tribes differing so widely in these most essential organs, the ovary, fruit and seed, are yet all bound together by means of the opposite leaves with intermediate stipules. The *Stellatæ* want that character, having in lieu of it, a whorl of leaves round the joints of the stem, on which account mainly, Lindley removes them from the order. *Caprifoliaceæ*

has opposite leaves, but no stipules; had they stipules, they must have been united, there being no other point of structure to separate them. *Apocyneæ* in like manner has opposite leaves without intermediate stipules, but combined with a superior ovary (a good character, but not unexceptionable, as there is a Cinchonaceous genus with a superior ovary,) *Loganicieæ* has stipules, but they are supra axillary and sheathing, and combined with a superior ovary. They agree, however, so well with *Rubiaceæ*, that they have been designated "Rubiaceæ with a free ovary." *Rubiaceæ* are considered by many Botanists nearly allied to *Compositæ*, this relationship does not strike me as near, though it certainly exists.

To this order we are indebted for that, to India, most valuable of medicines *Bark*, and its derivative Quinine also, for Ipecacuana with many others of minor note. The roots of *Morinda tinctoria* and of *Hedyotes (Oldenlandia) umbellata* supply very permanent red dyes, especially the latter, which is the basis of the bright Modina red so highly prized among natives of India—and last, but not least, to this family we owe that most delightful and wholesome beverage, Coffee and a few esculent fruits. A few species yield useful timber, such as our bastard cedar, the produce of our *Hymenodyction excelsum*, *Nauclea cordifolia*, and one or two other species of the same genus, which attain a large size in the Malabar jungles, also supply timber, but of inferior quality and of a yellow colour.

HEDYOTIS.

Calyx-tube ovate or globose: limb 4-toothed or 4-cleft, the teeth or segments persistent, without smaller intermediate ones. Corolla somewhat regular, infundibuliform, tubular, or rotate, 4-cleft, the segments imbricated (not twisted) in æstivation. Stamens 4, inserted into the mouth of the tube, or a litttle below it: anthers roundish, oblong, or short linear. Ovary crowned with a fleshy disk. Style filiform. Stigma bifid or 2-lobed, rarely entire. Capsule obovate, ovate or globose, crowned with the limb of the calyx, 2-celled, dehiscing at the apex within the calyx, in a direction transverse to the dissepiment, at length sometimes splitting to the middle or to the base, and either loculicidal or scepticidal. Seeds usually minute, numerous and angled, rarely few or solitary in each cell.—Herbaceous, suffrutescent, or shrubby plants. Stems 4-angled or terete: branches sometimes compressed. Stipules cohering with the petioles, usually fringed with several bristles, rarely entire. Inflorescence various.—*W. and A. Prod. p.* 405.

It is well remarked in our Prodromus, that this is a polymorphous genus not only in habit, but also in characters, for it certainly is such. But though this is the case, they are generally readily recognized. Some certainly have so much the habit of *Spermacoceæ*, that dissection of the ovary or fruit, is required to detemine to which of the two tribes they belong.

The species of this genus are numerous on the Hills, and many of them most unlike each other; some being large handsome flowering shrubs, and others minute, almost inconspicuous herbs. Here they are found in nearly all situations, and flowering at all seasons. The larger shrubby species are in greatest perfection about the beginning of the year, February and March, and then they are truly most conspicuous objects, when growing in somewhat moist, sheltered situations.

Hedyotis lawsoniæ, (W. and A.: shrubby, glabrous: branches 4-angled: leaves oblong-lanceolate, acuminated at both ends, petioled; nerves few and distant, curved: stipules deciduous, triangular-ovate, acuminated, the point thickened and glandular-lobed; the margin entire: panicle spreading: calyx-limb cup-shaped, 4-toothed: corolla externally glabrous, villous in the mouth, and on the segments slightly protruded: style considerably protruded: capsule obovate, dicoccous.—*W. and A. Prod. p.* 407.

A handsome but neglected shrub, found in the woods about Ootacamund and elsewhere, not very rare on the Hills. The flowers which in fine plants, form much larger clusters than those here represented, are so much of the lilac colour, that introduced into shrubberies, and some care bestowed on its cultivation, it might become a passing good substitute for the lilac. In open exposed situations where the soil is poor, it rarely exceeds two or three feet in height; but in shady woods with moist and rich soil, it rises to six or even eight feet, and when covered with blossoms is really a beautiful object. The upper flower-

Rungiah, del. Dumphy, Lith.

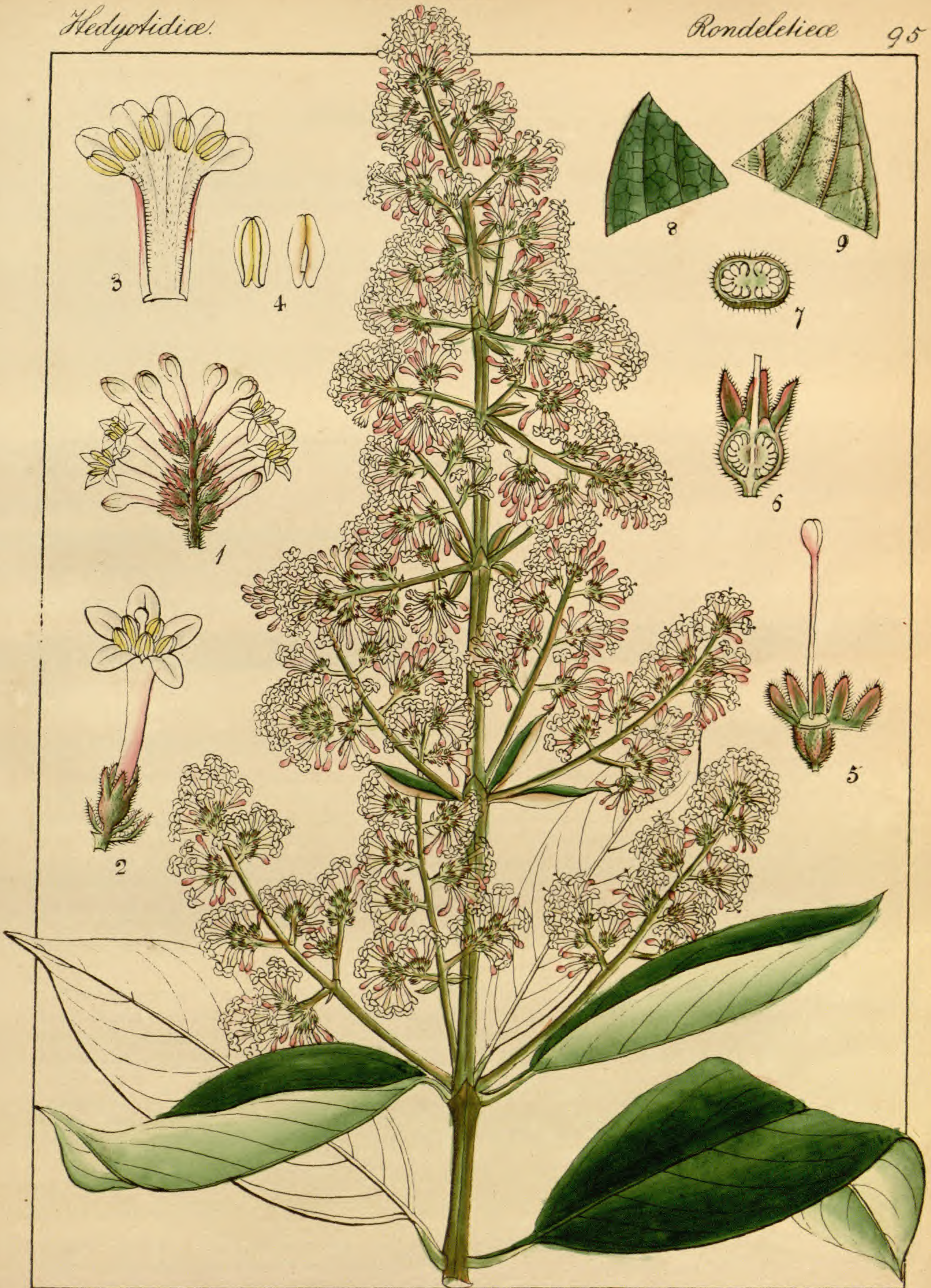
Hedyotis (D.) Lawsoniæ (W. & A.)

Rungiah, del. Dumphy, Lith.

Hedyotis (D) stylosa (Brown)

Rungiah, del. Dumphy, Lith.

Hedyotis verticellaris (Wall)



Rungiah, del. Dumphy, lith.

Wendlandia Notoniana (Wall)

ing branches only are four-sided, the older ones become nearly round. The drawing was made at Kotagherry in August, where it comes into flower during the rainy season.

HEDYOTIS STYLOSA (Brown :) shrubby, glabrous: branches somewhat terete or obtusely 4-angled: leaves from oval to oblong-lanceolate, acuminated at both ends, petioled; the nerves on the under side strong, armed, slightly branched: stipules somewhat permanent, triangular-ovate; their margin pectinately pinnatifid, the segments long, filiform, hirsute: panicle spreading: calyx-limb cup-shaped, 4-toothed: corolla externally glabrous, villous in the mouth on the segments: filaments considerably protruded: style much protruded: capsule ovoid, dicoccous.—*W. and A. Prod. p.* 389.

This is a much more abundant shrub than the preceding, and the clusters of flowers being larger, it is really a showy plant; but I have not once seen it in cultivation though abundant in the woods. The flowers are nearly white, and it is in flower at nearly all seasons.

HEDYOTIS (D.) VERTICELLARIS (Wall *Hed. plantaginifolia Arn. pug?*) perennial herbaceous, leaves nearly all radical, linear-lanceolate, nerved, plaited between the nerves glabrous, overlapping at the base; those of the scapes linear lanceolate: scapes as long or longer than the leaves, leafy; lower pairs of leaves distant opposite; upper ones approximated verticelled: stipules between the distant pairs bristle toothed: flowers sessile, capitate and terminal, or verticelled in the axils of the upper leaves: heads from the axils of the lower pairs peduncled: calyx segments linear lanceolate as long or longer than the tube of the corolla: corolla infundibuliform, hairy in the throat: stamens more or less exserted or included.

This unlike the other two, is a low herbaceous plant with perennial roots, or more correctly underground stems, the leaves spreading on all sides like a star on the ground. They have much the appearance of a *Plantago*, and like it are traversed by strong nerves running from the base to the apex, when young somewhat plaited. It grows in low, wet or even marshy soil. On the banks of the Pycarah river it is met with in considerable abundance, but on the Koondahs it is most abundant, every piece of marshy ground being full of it. It is every where in flower during the earlier months of February, March and April, but I first found it at Pycarah, in full flower in November; I therefore infer it is in flower at all seasons. It will form a very distinct section of the genus along with one or two Ceylon ones agreeing in its acauline plantago like habit. The flowers are lilac coloured interruptedly panicled on axillary peduncles. The leaves are so numerous and closely set at the base, that they hold water, hence I have always found a quantity of water in their axils however dry the weather, as if they had recently been exposed to a shower of rain. When in full flower it is certainly a beautiful plant. I can see no difference between this and *H. plantaginifolia* Arnott, and feel confident this last has been added to the list of described species, owing to Dr. Arnott not having a specimen to compare, and our description having been made from a scape only, not a perfect plant. The proper stems of both are under ground rhizoms, the leaves and scapes are the same in both—and so are the flowers and seed.

WENDLANDIA.

Calyx-tube somewhat globose, often striated: the limb very short, composed of 5 small persistent teeth. Corolla with the tube longer than the calyx, widest at the throat, glabrous or nearly so on the outside: limb spreading, 5-lobed; the lobes oblong or lanceolate, acute or obtuse, imbricated and slightly twisted in æstivation, and forming a globose or oval head to the flower-bud. Stamens 5: filaments springing from the very top of the tube, often very short: anthers oblong, exserted, oscillatory. Ovary crowned with a fleshy disk. Style exserted, filiform. Stigma of two pretty large, oval, thickish segments. Capsule globose, crowned with the limb of the calyx, 2-celled, splitting at the apex, loculicidal. Seeds minute, numerous in each cell.—Trees or shrubs. Leaves coriaceous, oval or lanceolate, petioled. Stipules solitary on each side, broad at the base, acuminated. Panicles thyrsoid, terminal, many flowered. Flowers white, small, very shortly pedicelled, forming spikes or fascicles along the ultimate ramifications of the panicle.—*W. and A. Prod. p.* 402.

There is, so far as I have been able to make out, only one species of this genus on the Hills, and that does not ascend to the higher ranges. About Coonoor and on that level it is very abundant; it also abounds about Kaitie Falls, where I obtained the specimen here delineated, in February, just coming into flower. When in flower this is a very handsome shrub, each branch terminating in a large panicle of whitish or pale rose coloured flowers.

WENDLANDIA NOTONIANA (Wall.:) arboreous, with the young shoots hirsute: leaves petioled, oblong, slightly tapering at both ends; upper side glabrous, under somewhat glaucous, more or less minutely pubescent, often nearly quite glabrous except on the nerves and veins: stipules triangular-ovate: hirsute at the base; the upper part glabrous, recurved: branches of the panicle hirsute, somewhat erect, flowers crowded and forming interrupted spikes: calyx hoary, the teeth triangular, acuminated: corolla glabrous, 6-8 times longer than the limb of the calyx tube widened at the mouth; divisions of the limb oval, obtuse, recurved; anthers nearly sessile: capsule sprinkled with short hairs.—*W. and A. Prod. p.* 403.

A large and very beautiful shrub frequent about Coonoor and Kotagherry, but not ascending to the elevation of Ootacamund. It also occurs abundantly, and in great perfection about Kaitie Falls, flowering in February and March, when it is most ornamental, often attaining a height of from 10 to 15 feet, with every branch terminated by a large panicle of reddish white flowers.

LASIANTHUS, Jack—*Mephitidia,* D. C. *Santia,* W. and A.

Calyx, limb 4-7 cleft. *Corolla* 4-7 cleft: *throat* and *limb* usually hairy, *Stamens* 4-7 inserted near the throat: *filaments* short: *anthers* oblong, scarcely exserted. *Ovary* crowned with a fleshy disk, 2-7-celled with a single erect ovule in each: *style* about the length of the corolla: *stigma* usually capitate, 2-7-lobed. *Drupe* globose, containing 2-7 nuts. *Nuts* usually rugose, or furrowed on the back. *Seed* erect: *albumen* fleshy, enclosing a cylindrical erect embryo.

Shrubs or small trees. Young branches, petioles and costa of the under surface of the leaves, usually clothed with long matted, or rigid adpressed hairs. *Stipules* caducous, bearing a ring of hairs or filiform bristle-like scales. *Leaves* short, petioled, usually elliptic, oblong, more or less acuminated at the apex, and tapering at the base; often hirsute on both sides, but generally on the costa and veins. *Veins* prominent, pinnate, running in curved lines towards the margin, the last pair forming, with the costa, a 3-nerved termination of the leaf; veinlets conspicuous, passing in nearly straight lines between the costa and veins, giving a peculiar and unique character to the venation. *Bracteas* often large and numerous, copiously clothed with long matted hair, forming a thick involucrum round the axillary sessile fascicles of flowers. Flowers always small in all the genuine species I have seen. *Calyx* limb sometimes much produced, and parted to the base, into subulate or lanceolate teeth; sometimes short and obtusely lobed, rarely truncated, and furnished with short, almost inconspicuous teeth. *Corolla* small, tubular, lobes of the limb spreading, and, with the throat, generally hairy. *Drupe* usually succulent, generally blue when ripe.

The hairs on all parts of the plant, especially where long and shaggy, are jointed, in some species almost approaching to moniliform. The leaves are said by Blume, to exhale a disagreeable odour: this I have not observed. In this definition of the genus, I have abbreviated the essential character, and extended the natural one, in the hope of giving it greater precision and strength.

This genus was first established by the late Mr. William Jack, for the reception of some plants, natives of the Eastern Islands. For reasons which I cannot adopt, it was changed by DeCandolle to Mephitidia, I therefore restore the original name, having fully stated my reasons for doing so in a paper published in the Calcutta Journal of Natural History. When preparing our Prodromus, we found specimens of the accompanying plant in my collection, and as it is somewhat different from the original species of the genus, we supposed formed the type of a new one, which we named *Santia.* That genus I also reduce, as not being sufficiently distinct from Jack's, hence the above two synonyms. Before doing so, I availed myself of the ample opportunities I had, of examining our plant in all its varying forms and stages, as well as comparing it with several other species in my collection, two or three of which are natives of the Hills, abounding on the western slopes towards Sysparah.

This genus is remarkable for its tendency to variation in the number of the parts of its flower. The calyx is from 4 to 7 lobed, so is the corolla, the stamens and styles vary in like manner from 3 to 7, but in habit, the agreement throughout the whole, is quite remarkable, and is most conspicuous in the variation of the leaves which is quite peculiar. In nearly all, the flowers are axillary and nearly sessile, forming double capitula in the axils, generally furnished with bracteas, in some very large, quite foliaceous; in nearly all the lobes of the corolla is densely clothed with short hairs, giving it a velvetty appearance, whence the generic name, in all the ovules are erect, a useful mark towards distinguishing them from some other genera, with pendulous ovules, and in nearly all the fruit is a blue berry. The leaves of some exhale a fetid odour, which suggested the name Mephitidia.

The genus includes about 40 known species, all natives of India and the Eastern Islands, and it seems probable there are many yet to be discovered. Regarding their properties nothing is yet known; most of them are shrubs.

Lasianthus venulosus (R. W. *Santia venulosa* W. and A.) shrubby, glabrous: stipules triangular hairy: leaves coriaceous, short petioled, elliptic-oblong, cuspidate or acuminate, glabrous above; veins prominent on both sides beneath sprinkled with hairs: cymes axillary, short peduncled, few (3-5) flowered: bracteas small hairy: calyx 4-5 parted, divisions subulate, as long as the tube of the corolla: corolla 4-5 cleft, throat and lobes hairy: stamens 4-5: style as long or often longer than the corolla 3-5 lobed: cells of the ovary equalling the lobes of the stigma; a single erect ovule in each.

Common in the woods about Ootacamund, and generally distributed over the higher ranges of the

Rungiah del. Dumphy, Lith.

Lasianthus venulosa (R.W.)
Santia venulosa (W & A)

Rungiah del. Dumphy Lith

Canthium umbellatum (R.W.)

Hills—a very ramous shrub: leaves from 2 to 4 inches long by about half as much broad, of a light yellowish green colour, sometimes acuminate, oftener cuspidate. Flowers pale yellow or cream coloured, berries about the size of a pea, succulent, blue. The long teeth of the calyx of this species, is very characteristic. The inflorescence is essentially cymose, but the peduncles are sometimes reduced to one flower.

CANTHIUM.

Calyx-tube ovate; limb short, 4-5 toothed. Corolla with a short tube, bearded in the throat; lobes 4-5, spreading. Anthers 4-5, inserted into the throat, scarcely exserted. Style filiform exserted. Stigma thick, ovate-globose or mitriform, undivided or bifid at the apex. Drupe globose or compressed, crowned with the (sometimes inconspicuous) calycine teeth, fleshy, 2-celled. Seeds solitary in each cell, inserted near the apex, inverted, incurved. Albumen fleshy. Embryo central: radicle long, superior.—Shrubs, with branches unarmed or thorny. Leaves opposite, somewhat coriaceous. Stipules interpetiolar, solitary on both sides. Peduncles axillary, short, several flowered.

The plants composing this genus are for the most part thorny shrubs; the one here represented, however does not partake of that character, and is, I believe, the largest and handsomest species of the genus: so far as the flora, this part of India is concerned, it certainly is. There is another species very like this in every thing except one point, the inflorescence, which is sufficiently abundant on the plains of India, this I have never seen except as an Alpine plant. The other, *C. didynum*, differs from this in having a loose cyme of flowers in the axils of the leaves, while here all the branches which go to form the cyme in that, are united into one, forming together a thick, short peduncle, the somewhat dilated apex of which is covered with longish pedicelled flowers, forming a simple umbel, whence the name.

The genus itself is not considerable, including only about 24 or 25 species, and of these not one of any note. It belongs to the *Coffea* section of the order, distinguished by having a two-celled ovary with a single more or less pendulous ovule in each. The flowers of this genus possess a peculiarity not elsewhere met with, so far as I am aware, the throat is full of hair, the lower series of which, in place of being directed upwards towards the surface, hangs downwards like a curtain within the tube. In the flowers of our plant, this is not so conspicuous as in some of the other species, and requires to be looked for, to be properly seen, and has evidently escaped the observation of the artist, who has not done justice to that part of the analysis. The stigma of all the species is large, more or less mitriform. These are the only points of any note, and in truth, may almost be said to constitute the character of the genus, which seems so little distinguished from several others in its vicinity, each consisting of few species, that one can scarcely avoid thinking some of them might have been dispensed with by merely giving a slight extension to the character, among which *Damnacanthus*, *Plectronia*, and *Psydrax* may be mentioned: *Dondisia*, D. C. has been already referred here.

Canthium umbellatum (R. W.) shrubby or subarboreous, unarmed; young branches four-sided: leaves short petioled, oval acuminated glabrous, coriaceous: flowers axillary umbelled on a short thick peduncle: calyx limb obtusely 5-lobed: tube of the corolla hairy within, the lower hairs pointing downwards: stamens 5: style exserted: stigma mitriform, 2-lobed, fruit obovate didymous.

An alpine plant rather rare on the Neilgherries about the elevation of Kotagherry, where in the Orange Valley I found it forming a moderate sized tree. I also found it in great abundance on the tops of the Hills at Shevagherry in full flower in September. It is very nearly allied to *C. didymum* from which it scarcely differs except in the inflorescence, and subarboreous habit of the plant generally: the leaves when the two are compared are found much larger and more coriaceous in this, but its most striking characteristic, is the union of all the branches of the cyme into a single stout peduncle from the dilated apex of which, the flowers rise on short pedicels—Flowers white.

GRUMILEA.—PSYCHOTRIA.

Grumilea (*Gært.*) Calyx-tube obovate, very short; limb cup-shaped, truncated and 5-toothed. Corolla infundibuliform; tube short, villous in the mouth: limb 5-partite, segments incurved at the point: æstivation valvular. Stamens 5, inserted upon the tube: filaments short: anthers oblong, exserted. Style filiform, the length of the tube or of the corolla, surrounded at the base by a short cylindrical or 5-lobed fleshy disk. Stigma bipartite (occasionally 3-partite); divisions thick. Berry crowned with the converging limb of the

calyx, ovate-globose, somewhat coriaceous, 2- (or occasionally 3- sometimes from abortion 1-) celled. Seeds solitary in each cell, plano-convex or angled. Albumen somewhat cartilaginous, grumose (divided into small lobes by numerous chinks and fissures). Embryo erect, small, slightly curved, somewhat dorsal: cotyledons lanceolate.—Glabrous shrubs. Leaves opposite, petioled, attenuated at the base. Stipules usually with hair at their base on the inside, often caducous. Corymbs terminal. Flowers sessile.—*W. and A. Prod. p.* 432.

PSYCHOTRIA (*Linn.*) Calyx-tube ovate; the limb short, 5-lobed, 5-toothed or somewhat entire. Corolla infundibuliform, usually short, 5- (or rarely 4-) cleft, regular: throat glabrous or bearded; limb spreading or recurved, segments incurved at the point: æstivation valvular. Stamens 5 or rarely 4; the anthers exserted or included within the throat of the corolla. Stigma bifid. Berry drupaceous, containing 2 nuts, crowned with the limb of the calyx, usually marked with 10 ribs by drying, sometimes 4-angled and with 4 furrows, sometimes even. Nuts chartaceously coriaceous, ribbed, angled or even, 1-seeded. Seed erect, with a cartilaginous solid (not ruminated) albumen. Trees or shrubs, rarely herbaceous plants. Leaves opposite, petioled. Peduncles usually terminal. Flowers panicled or corymbose.—*W. and A. Prod. p.* 432.

These two genera are, in my opinion, part and parcel of the same, the former only constantly differing from the latter in one point, of all those enumerated in these two long characters—that one point is stated in these few words under *Grumilea,* "Albumen somewhat cartilaginous, grumose." Beyond that there is not a single character assigned to *Grumilea,* that is not to be found among the numerous species of *Psychotria.* For these reasons, I have come to the conclusion that the two genera ought to be united, and I therefore club them together here, considering them but one.

The species are all shrubs, many of them very handsome, not on account of their flowers, which are generally small, and so much concealed among the leaves, as to be little conspicuous, but on account of their compact form and bright shining foliage. In this point of view, the *Grumilea* is a shrub well deserving a distinguished place in every ornamental shrubbery, as it might, on the hills, supply the place of the Holly in English gardens. The *Psychotria* is also a pretty shrub, but according to my taste, not equal to the other.

There are two species of Grumilea currently met with on the Hills, and so very like each, that they may easily be mistaken for each other, as they are only distinguishable by the inflorescence, the one, namely, here represented and another which I have called *G. elongata,* in reference to the flowers which form an elongated panicle like cyme. I introduce the distinctive characters of both to prevent their being confounded.

I shall conclude these general remarks on the two genera which perhaps I should have united under the older name by appending a few observations extracted from my Icones just published.

"OBS. These two genera *Grumilea* and *Psychotria* ought to be united as they are truly one in every thing except the ruminated albumen of the former; a character, which, however good in a mere carpological system, is too limited for a vegetable one (which requires its generic characters to be taken from more organs and structures than one) as it can only be made out from ripe seed. If both are preserved, I believe, I may almost predict that probably half the present genus *Psychotria* must ultimately be transferred to *Grumilea* and then, without specimens furnished with ripe fruit no man can tell whether an unknown species belongs to the one or other genus. Our P. *bractiata* I feel certain will, when the ripe seed is found, prove a *Grumilea:* Wallich's P. *truncata* I am all but certain is a *Grumilea,* and I think identical with our *G. congesta* —Genera in a natural system surely ought not to rest on a solitary character, unsupported by habit, and still less so when that is only to be found in the ripe seed which, as distinct from *Psychotria,* is certainly the case with *Grumilea.*"

GRUMILEA ELONGATA (R. W.) shrubby glabrous: leaves short petioled, obovate oblong, cuspidately acuminate: penninerved; becoming yellowish in drying: stipules caducous, ovate oblong, broad pointed, cymes elongated, panicle-shaped, compact when in flower, enlarging somewhat in fruit: calyx limb minutely 5-toothed: tube of the corolla short, throat closed with hairs: style embraced at the base by a thick convex fleshy disk, stigma exserted, dilated, 2-lobed.

GRUMILEA CONGESTA (W. and A.) erect: leaves short petioled, oblong, acuminated at both ends, penninerved becoming yellowish by drying: stipules broadly triangular, cuspidate, caducous: corymbs sessile, at first compact and scarcely longer than the stipules, afterwards larger but also compact or rarely spreading when in fruit, naked: calyx-limb somewhat bluntly 5-toothed: tube of the corolla short, scarcely longer than the calyx-limb: berry ovoid, not furrowed.—*W. and A. Prod. p.* 432.

Both are frequent in the woods about Ootacamund, I also possess specimens of the latter from several other stations, Courtallum, Shevagherry, &c. They are unquestionably very nearly allied to each other, but are, I think, abundantly distinct species, as well

Rungiah, del. Dunphy, Lith.

Grumilea congesta (W&A)

Rungiah del. Dumphy, Lith.

Psychotria bisulcata (W & A)

Rungiah, del. Dumphy, Lith.

Coffea alpestris (R.W.)

Rungiah, del. Dumphy, Lith.

Coffea grumelioides (R.W.)

by character as habit; the two bushes, even when growing side by side, generally flowering at different seasons. The flowering season of the latter is the autumnal months, that of the former the spring ones.

PSYCHOTRIA BISULCATA (W. and A. :) shrubby, diffuse, glabrous: leaves with a short petiole slightly dilated at the base, oblong-lanceolate, tapering at the base: stipules triangular-acuminated, caducous: corymb terminal, peduncled, small, few-flowered, trichotomous or with the primary rays in fives, with minute acute bracteas subtending the ramifications: calyx-limb 5-lobed; lobes roundish-ovate: tube of the corolla bearded in the throat, about twice the length of the calyx-limb: filaments exserted; anthers oblong: stigma nearly included, short and thick, bipartite: berry ovate, 4 furrowed by drying: seed and albumen flat on the inner side, with two deep dorsal furrows and an intermediate broad clunt ridge.—*W. and A. Prod. p.* 434.

In woods about Ootacamund but rather sparingly. The leaves are of a light lively green, and dry almost unchanged in colour.

COFFEA.—COFFEE.

Calyx-tube ovate, globose or turbinate; limb small, 4-5-toothed. Corolla tubular, infundibuliform; limb spreading, 4-5 partite, the lobes oblong: æstivation twisted. Stamens 4-5, inserted on the summit or middle of the tube, exserted or included. Style bifid at the apex, the lobes rarely cohering. Berry umbilicated, naked or crowned with the calyx-limb, containing two somewhat parchment-like 1-seeded nuts. Seed convex on the outer side, flat and marked with a longitudinal furrow on the inner. Embryo erect in a horny albumen; radicle terete, obtuse; cotyledons foliaceous.—Trees or shrubs. Leaves opposite. Stipules interpetiolar.

This character is adopted from DeCandolle, except what we have added relative to the æstivation of the corolla: we fear it is not sufficient to distinguish the genus from several others; and moreover it is exceedingly doubtful that several species, of which the fruit is unknown, do accord with it: the anthers in all the specimens we have seen are long-linear.—*W. and A. Prod. p.* 435.

This is an extensive genus of fine flowering shrubs including fully 50 species. It seems doubtful however whether its limits are well defined. DeCandolle remarks the probability of its requiring to be divided, while Dr. Arnott in the above note doubts whether the characters are sufficient to distinguish it from several others. Be that as it may it seems sufficiently certain that, as regards the flora of Southern India, it is sufficiently distinct, at least if I am correct in referring here the two species described below, which I see no very obvious reason to doubt as they correspond well with one exception with the character, the exception being the clavate not bifid stigma and that I cannot consider of sufficient importance to nullify all the rest, especially on considering that they do sometimes cohere. Assuming then, which I think I may safely do, that both are true Coffeas, there can be no difficulty in distinguishing this genus from all the others yet found in this part of India by the above generic character whether adequate or not as applied to the flora of the world.

The genus as at present constituted occupies a very wide range—Africa, Asia, and America—both North and South—claim indigenous species, but all confined to the warmer regions, either actually within the tropics or within a few degrees of either side. In Mexico, Brazil, and Peru they abound—there are several from Africa while India and her islands claim about ¼ of the whole number. On the properties of Coffee I conceive it quite unnecessary to offer any remark, but it may be observed that the Coffea Arabica is the only one which contributes towards the support of man, and it, history informs us, has been in use as an aliment from a very ancient date, as records actually exist proving its use in Persia in the 8th century of the present æra, how much earlier it is impossible to say, and in the middle of the 16th century its use had become so far introduced into Europe that Coffee houses were established for its sale in both Paris and London. Now it has become almost a necessary of life all over Europe, the Western portions of Asia, and adjoining provinces of Africa, and it is much to be desired that its greater abundance in India enabled it to supersede the deleterious Toddy, so generally consumed by nearly all the lower classes of Hindoos.

Let us hope therefore that this much to be desired result, which is already in progress, may soon be brought about by the activity of commercial enterprize so keenly embarked in the production of Coffee.

COFFEA ALPESTRIS (R. W.) shrubby, glabrous: leaves lanceolate, cuneate towards the base, pointed, coriaceous: peduncles axillary, confined to the upper leaves, longer than the petioles, aggregated, forming terminal corymbs: corolla five cleft; divisions much longer than the tube, lanceolate, obtuse: anthers exserted style: gibbous near the base, hairy: stigma clavate, glabrous; berry oval 2-seeded.

Ootacamund in woods flowering March and April. A low very ramous shrub the branches nearly naked, the ramuli covered with closely approximated coriaceous shining leaves: peduncles confined to the terminal axils, generally about 3-flowered; flowers white with a hairy throat and line of hairs extending along the segments of the corolla.

Coffea grumelioides (R. W.) shrubby or subarboreous, glabrous: leaves obovate cuneate, shortly and bluntly acuminate, coriaceous: peduncles axillary, confined to the upper axils, about 3-flowered, forming terminal corymbs: corolla 5-cleft, throat hairy, divisions oblong elliptic obtuse; anthers exserted: style not gibbous: stigma clavate, slightly cleft at the apex: berry ovoid, crowned with the persistent calyx.

A large shrub or small tree, in low woods by the road side going to Pycarah, flowering in February. This seems to be a rarer species than the preceding and is confined to a lower range of elevation. Though in many respects like C. *alpestris* this is certainly a distinct species.

GALLIUM.—*Bedstraw, Cleavers, &c.*

Calyx-tube obovate-globose or oblong, with scarcely any limb. Corolla 4- (very rarely 3-) partite, rotate. Stamens short. Styles 2, short. Fruit didymous, roundish, rarely oblong, dry, composed of 2 indehiscent 1-seeded mericarps.—Herbaceous branched plants. Leaves with the stipules forming a verticil.—*W. and A. Prod. p.* 442.

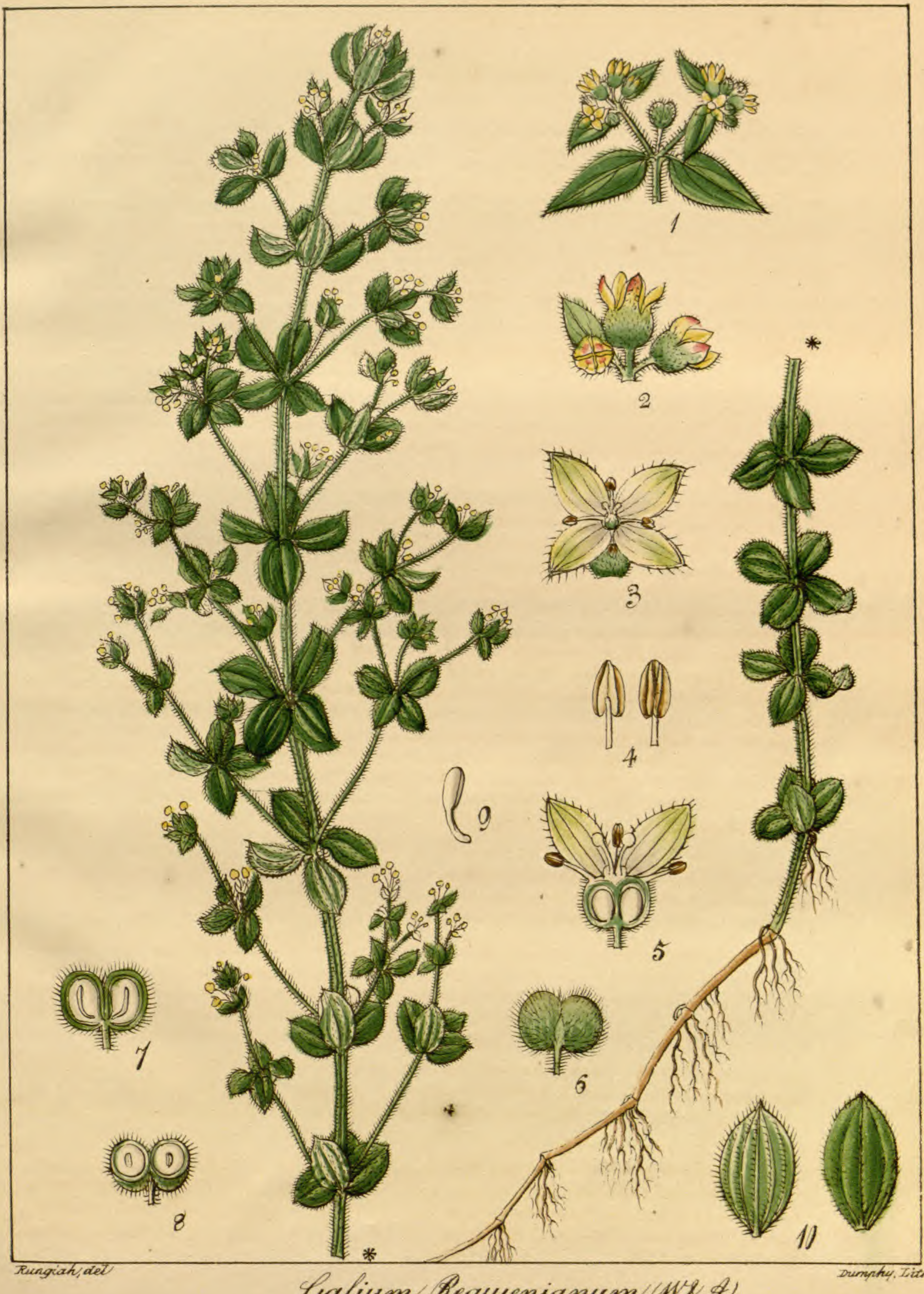
I mentioned above that Dr. Lindley proposed separating the section Stellatæ including *Gallium, Rubia,* &c., from the rest of the order, and elevating it to the rank of a distinct order, mainly on the grounds of the plants composing it not having stipules, but in their place verticels of leaves. He has not succeeded in persuading other Botanists to adopt this view, as they object that all except two of the leaves of the whorl are in fact stipulary appendages, since they, however much they resemble leaves in form and appearance, are not truly such being destitute of axillary buds. This objection has scarcely been met by Dr. Lindley. He argues thus—"The only ground on which this is intelligible is that taken by DeCandolle and others who consider the apparent leaves of *Stellatæ* to be in part true leaves, and in part leaf-like stipules. To this verbal but not real distinction there is this objection, which I conceive quite fatal to it. If part of the leaves of each whorl of Gallium were stipules, they must bear a certain proportion to the true leaves; suppose the whorl to consist of two leaves, each will have two stipules, and consequently the whole number of parts in the whorl must be six, and in all cases the number must be some power of three." Such not being the case in nature, he considers "an incontrovertible proof that the apparent leaves of *Stellatæ* are true leaves and not a modification of stipules." To all this of course the simple answer is, if they are leaves, where are their axillary buds which all true leaves have? if not, why should not their number vascillate as readily as the number bristles on the stipules of a *Spermacoce* or *Hedyotis.*

So far as Dr. Lindley has carried out his answer to DeCandolle's "verbal distinction," it can only be viewed as special pleading, as he has failed to prove by any decisive mark, that the apparent leaves are true ones, nor has he shown that viewed as stipules their number might not vary the same as the number of bristles in *Spermacoce,* which, if they became developed, might in like manner assume the form of leaves.

Such was the state of the question when the late Mr. Griffith took it up, and by showing that the apparent corolla is simply a coloured dilatation of the calyx, and that there is in fact no corolla, established on something like reasonable grounds, the correctness of Lindley's view in severing this section from the rest of the order, which Lindley has certainly failed in doing for himself. According to Mr. Griffith's views of its structure *Galiaceæ* or *Stellatæ* should rank near *Nyctagyniæ,* in the monochlamedious class of DeCandolle.

The genus *Gallium* is one of great extent, including in all about 200 species, and is truly cosmopolite, being found in all parts of the world, but is rare in the tropics. In India, the very few species we have are all alpine, and of little interest or value, unless perhaps in connection with the Botanical question we have just been discussing.

The genus *Rubia,* one of this tribe, has 2 species which are valuable as yielding excellent red dyes—namely, *R. tinctorum* the Madder of Europe, and *R. cordifolia* the manjettie of the Tamools. The latter is abundant on the slopes of the Neilgherries and might be collected in vast quantities with little trouble or expense and, as I believe it bears a high price in markets where its value is known, might yield a profitable return to speculators in that article.



Rungiah, del Dumphy, Lith

Galium Requenianum (W&A)

GALLIUM REQUIENIANUM (W. and A. :) perennial: stems diffuse, ascending, branched, and the branches 4-angled, clothed with much soft spreading or deflexed hair, when old more glabrous: leaves in fours, roundish-obovate, mucronate, 3-nerved; upper sides sprinkled with hairs; under more copiously hairy, particularly on the nerves and margin: peduncles axillary or terminal, few flowered, trichotomous, hairy: divisions of the corolla roundish-ovate, slightly hairy on the outside: fruit roundish, hispid with hooked bristles.—*W. and A. Prod. p.* 443.

This is a low growing procumbent plant which, but for the large patches it forms, would be but little conspicuous from the grass among which it grows. I believe it is in flower the greater part of the year.

I copy the following note from my Icones, No. 1042, as bearing on the question above adverted to.

"The late Mr. Griffith was of opinion that the Stellate division of Rubiaceæ were misunderstood and erroneously described in calling the yellow petaloid part of the flower, a corolla. That, he once stated to me in a letter, he considers merely the coloured dilated calyx limb. I have since often examined the flower with reference to that view of its structure, but have scarcely been able to satisfy myself that there is not both a calyx and corolla. The Draftsman seems here to have settled the point in Mr. Griffith's favour. He knows nothing of Botanical opinions or theories, but sets down what he sees, and here he has assuredly given no corolla, and I think he is right; in which case this section must, as Lindley has done, be elevated to the rank of an order and will stand in the same relationship to *Spermacoceæ* that *Nyctagineæ* does to *Plumbagineæ*."—*Wight's Icones, No.* 1042.